MAINTENANCE MANUAL

PRESTON

instruction manual

X-MOD 134A

sine wave source

PRESTON SCIENTIFIC INCORPORATED
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INSTRUCTION MANUAL

X-MOD 134A

SINE WAVE SOURCE

S/N

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805 EAST CERRITOS AVENUE
ANAHEIM, CALIFORNIA 92805

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SECTION 1
GENERAL INFORMATION

1.1 INTRODUCTION

1.2 SPECIFICATIONS

1.1 INTRODUCTION

The X-MOD 134A Sine Wave Source is a wide range precision oscillator providing frequencies from 10 Hz to 10 MHz. Frequency selection is determined by a six-position decade switch and a vernier with a multiplication factor of 1 to 10. The unit provides 10 switch selected voltage and db calibrated outputs with a choice of two output impedances. The oscillator output voltage is constantly monitored by a voltmeter at the input to the output attenuator system. This meter is calibrated in volts and dbm with provision for expanding the sensitivity by 20 times. All operational controls are on the front panel of the unit. Maintenance is minimized by the use of plug-in printed circuit boards which may be readily replaced.

1.2 SPECIFICATIONS

FREQUENCY: 10 Hz to 1 MHz in six switch selectable decades with a vernier multiplication factor of 10 creating an overall range from 10 Hz to 10 MHz.
DIAL FREQUENCY ACCURACY: ±2% from 100 Hz to 1 MHz, ±3% from 10 Hz to 100 Hz, ±3% from 1 MHz to 10 MHz, including warm up drift and ±10% line variation.
FREQUENCY INSTABILITY: Less than 20 ppm after a 30-minute warm up.
FREQUENCY DISTORTION: Less than 1% from 10 Hz to 5 MHz, less than 2% from 5 MHz to 10 MHz.
OUTPUT POWER: 200 mw (3.16 V) into a 50 ohm load, 16 mw (3.16 V) into a 600 ohm load.
OUTPUT VOLTAGE: 6.3 volts with an open circuit.
AMPLITUDE STABILITY: Less than 0.1% for 12 hours.
HUM AND NOISE: Less than 0.05%.
OUTPUT IMPEDANCE: Two output impedance are available, 50 ohm and 600 ohm.
ATTENUATOR: +20 to -70 db attenuator in 10 steps with a ±0.1 db vernier between steps.
ATTENUATOR ACCURACY: ±0.1 db from 0.001 volts to 3 volts.
MONITOR: Monitors input to attenuator and is calibrated in volts and dbm. The monitor scale is expandable by 20 within a range of 0.9 to 1 volt or 2.4 to 3.2 volts.
MONITOR ACCURACY: 2% of full scale.
MONITOR FLATNESS: ±1% of full scale from 20 Hz to 4 MHz, ±2% of full scale from 10 Hz to 20 Hz and 4 MHz to 10 MHz.
EXPANDED SCALE FLATNESS: ±0.25% at 25°C ±10°C, from 10 Hz to 10 MHz, from 0.001 volts to 3.0 volts.
OPERATING TEMPERATURE RANGE: From +4°C to +40°C with a relative humidity not to exceed 90%.
NON OPERATING ENVIRONMENT: The unit will maintain operating condition after being stored for up to 48 hours with a temperature range from -55°C to +60°C at an altitude not to exceed 40,000 feet above sea level.

TILT DROP: The unit is capable of operating satisfactorily without permanent damage or degradation of accuracy after being subjected to a tilt drop on each of its four sides, using the opposite side as a pivot, for a maximum of 4 inches with a free drop to a solid surface.

VERTICAL AND LATERAL SHOCK: The unit is capable of operating within the stated specifications after being subjected to vertical and lateral shock of 15 G for a maximum of 11 milliseconds.

VIBRATION: The unit is capable of operating within the stated specifications after being subjected to a vibration frequency range of 10 to 50 Hz at a total excursion of 0.01 ± 0.006 inches in each major axis; the frequency varying uniformly from 10 to 50 Hz and returning to 10 Hz in approximately 5 minutes.

ENVIRONMENTAL CONDITIONS: For proper operation the ambient environmental conditions should include a temperature range from +4°C to 40°C, a relative humidity not to exceed 90% and a maximum altitude of 10,000 feet above sea level. The unit does not contain a built-in fan.

POWER REQUIREMENTS: 115/230 volts AC, 50 to 1000 Hz, 30 watts.

DIMENSIONS: 13 inches long, 19 inches wide and 5.25 inches high, to conform to standard 19-inch relay rack.

WEIGHT: Maximum 20 pounds.

SECTION 2
INSTALLATION

2.1 INTRODUCTION

2.2 INSPECTION

2.3 SHIPPING KIT

2.4 POWER REQUIREMENTS

2.5 MOUNTING

2.1 INTRODUCTION

This section outlines the procedure for the inspection and installation of the X-MOD 134A Sine Wave Source.

2.2 INSPECTION

As soon as the X-MOD 134A is unpacked, inspect the unit for damage in shipment. Check for scratches, dents, and damaged knobs or connectors. If damage is noted, remove the top cover by removing the retaining screws (8) and check the internal assembly for cracked circuit boards, loose connections, loose hardware, or damaged parts. If external or internal damage is noted, contact the insuring agency before operating the instrument.

2.3 SHIPPING KIT

The shipping kit should be inspected when the unit is received and should include one power cord, one pair of adjustable drawer slides, one pair of adapter blocks, and one set of miscellaneous hardware. The drawer slides are for use when the oscillator is to be mounted in a standard 19-inch relay rack. Assembly of the drawer slides is explained in Section 2.5.

2.4 POWER REQUIREMENTS

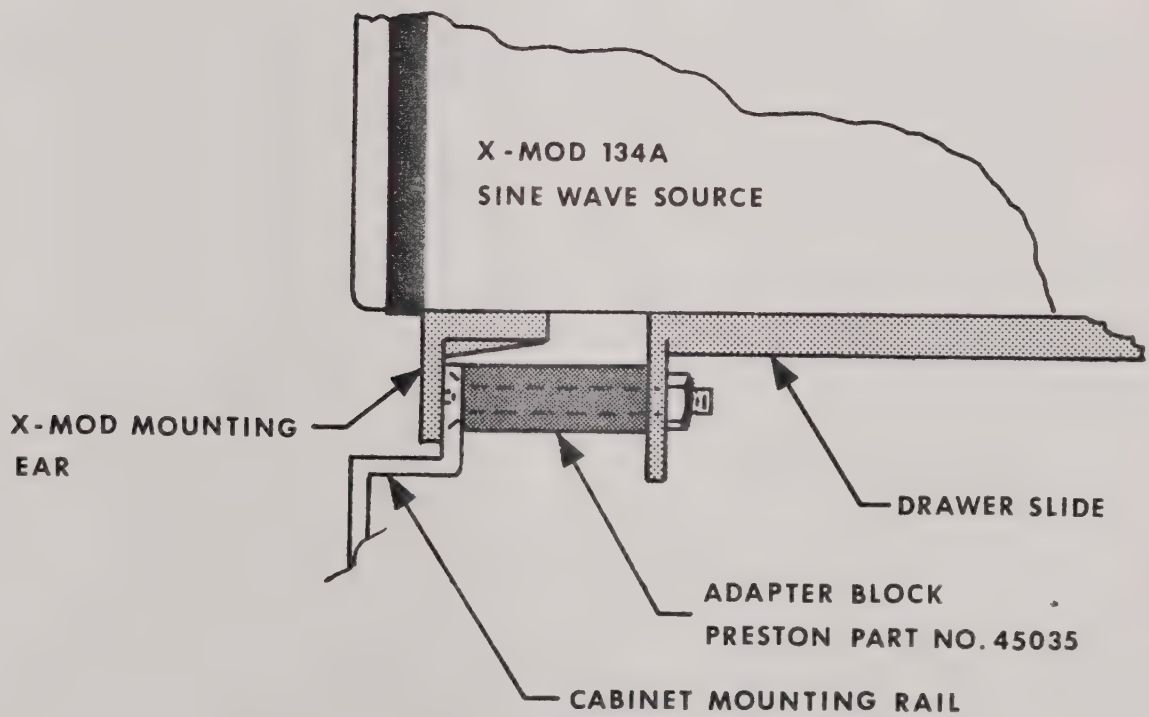
X-MOD 134A Oscillators are equipped with a three-conductor power cable that grounds the instrument when the connector is plugged into a matching receptacle. To preserve this safety feature when operating with a two-contact outlet, use ad adapter and connect the pigtail to a suitable ground.

X-MOD 134A Oscillators are designed to operate from a 115 or 230 volt AC +10%, 50 to 1000 Hz, 30 watts power source.

2.5 MOUNTING

The X-MOD 134A Oscillator may be bench operated or mounted in a standard 19-inch rack. When mounting the unit in a rack the adapter block (see shipping kit) must be located between the rear side of the rack mounting strip and the front of the drawer slide flange. The rack mounting strip hole must be counter-sunk to accommodate the drawer slide mounting screw. Refer to Figure 2.1 for proper assembly. Extra long screws are provided in the shipping kit for use with the adapter blocks.

Figure 2-1



SECTION 3
OPERATION

3.1 CONTROLS AND CONNECTORS

3.2 OPERATION CHECK

3.1 CONTROLS AND CONNECTORS

All controls and connectors required for the normal operation of the X-MOD 134A are located on the front panel of the unit. To make full use of the instrument the operator should be familiar with the function and use of each of these controls and connectors.

FREQUENCY RANGE SWITCH: Operates with FREQUENCY VERNIER to select frequency. Six frequency ranges are provided in decade steps starting with 10 Hz and ending with 1 MHz. This setting indicates the multiplication factor which must be applied to the FREQUENCY VERNIER to determine the desired frequency.

FREQUENCY VERNIER: Permits continuous tuning of frequencies. The vernier dial is calibrated from 1 through 10. This setting multiplied by the FREQUENCY RANGE switch setting results in the desired frequency.

POWER SWITCH: Two-position toggle switch for ON, OFF control of primary power.

POWER ON INDICATOR: Neon indicator for power ON condition.

OUTPUT ATTENTUATOR: Controls attenuation of the output signal in conjunction with amplitude control. Calibrated in 10 decade steps of db from -70 to +20 and in volts and millivolts.

AMPLITUDE AND VERNIER: Concentric coarse and fine output controls used in conjunction with output attenuator.

OUTPUT CONNECTORS: Two BNC connectors permitting both 50 ohm and 600 ohm outputs.

MONITOR: Continuously monitors output and calibrated in volts and dbm. Full scale value is dependent on position of output attenuator. Zero dbm is 1 millivolt into 50 ohms.

MONITOR ZERO: Sets monitor mechanical zero with the primary power off.

EXPAND/NORMAL SWITCH: Two-position toggle switch for either normal or expanded operation of the monitor. The expanded mode increases the monitor sensitivity by a factor of 20 and the expandable range is from 0.9 volts to 1.0 volts or 2.8 volts to 3.2 volts.

REF SET AND VERNIER: Concentric coarse and fine controls for setting the reference voltage in the expanded mode of the monitor.

PRIMARY POWER SWITCH: Rear panel screwdriver actuated slide switch for selective primary voltage of either 115 or 240 volts AC.

FUSE: Located on the rear panel, the fuse holder should contain a 1 ampere "slow blow" fuse for 115 volt AC operation. If the primary source is to be 230 volts AC, a 1/2 ampere "slow blow" fuse must be used.

3.2 OPERATION CHECK

The following preliminary check may be used to insure that all circuits are in proper operating condition when the unit is first energized. Refer to the

maintenance section of this manual for complete calibration and specification checks.

(a) Make sure that the PRIMARY POWER switch (located at the rear of the instrument) is in the proper voltage position (115 or 230). Also check the fuse holder for the correct value fuse.
(b) Connect the unit to the power source. Set the power switch to the ON position insuring that the POWER ON INDICATOR is functioning.
(c) Set the front panel controls to the following positions:

CONTROL	POSITION
Frequency Vernier	1
Frequency Range Switch	10
Output Attenuator	-70 dbm
Amplitude and Vernier	Maximum Counterclockwise
Expand/Normal Switch	Normal
Ref Set and Vernier	Maximum Counterclockwise

(d) Load the 50 ohm output with 50 ohms and connect the output to an oscilloscope. Set the oscilloscope time base and amplitude controls to approximate values for viewing the oscillator's output.
(e) Adjust the Amplitude and Vernier controls from minimum to maximum. Viewing the output on the oscilloscope and the output monitor, insure that the output voltage increases and decreases accordingly. Also, adjust the oscilloscope amplitude controls to keep the output on the visible.

(f) Set the oscillator Amplitude and Vernier controls to approximately mid-range and vary the FREQUENCY VERNIER control from 1 to 10 insuring that the frequency increases accordingly.
(g) Set the FREQUENCY VERNIER control to approximately mid-range and step the FREQUENCY RANGE switch from 10 Hz to 1 MHz. Adjusting the oscilloscope accordingly and insure that the frequency of the oscillator frequency increases with each step.
(h) Set the frequency to 1000 Hz.
(i) Step the Output Attenuator from -70 dbm to +20 dbm, increasing the oscilloscope amplitude accordingly, and observe that the oscillator output increases with each step.
(j) Set the oscillator output to 3 volts rms. The monitor should indicate in the red portion of the voltage scale.
(k) Switch the EXPAND/NORMAL switch to EXPAND and vary the REF SET and VERNIER insuring that the monitor varies accordingly.
(l) Set the REF SET and VERNIER such that the monitor is at mid-scale and vary the amplitude VERNIER. Observe that the monitor varies accordingly.

(m) Return all control positions to those listed in step (c) except for amplitude and frequency. Set the amplitude to 1 volt and set the frequency for 1000 Hz.

(n) Connect a 600 ohm load to the 600 ohm output terminals. Connect the output to the oscilloscope and check for an output of approximately 1 volt. This step insures that the 600 ohm output is functioning.

SECTION 4
CIRCUIT DESCRIPTION

4.1	INTRODUCTION
4.2	THEORY OF OPERATION
4.3	OSCILLATOR
4.4	BUFFER AMPLIFIER
4.5	MONITOR CIRCUIT
4.6	POWER SUPPLIES

4.1 INTRODUCTION

This section contains a discussion of the design and operating principles of the X-MOD 134A Sine Wave Source. The theory of operation is first discussed on a block diagram level and then a detailed description of each basic circuit.

4.2 THEORY OF OPERATION

The X-MOD 134A consists of 7 besic elements:
(1) the unregulated power supply, (2) the regulator assembly, (3) the oscillator assembly, (4) the buffer amplifier assembly, (5) the range switch assembly, (6) the monitor circuit, and (7) the attenuator assembly. Refer to Figure 8.1, Section 8, for the block diagram.

The oscillator board, multiplier switch, and frequency capacitor are integrally mounted in a metal enclosure. This is done to shield the oscillator. The output of the oscillator is applied to the input of the buffer amplifier. The buffered signal is applied to the output attenuator and the monitor circuit. The output of the attenuator is fed to the front panel BNC connectors. The output of the monitor circuit is fed to the front panel meter.

4.3 OSCILLATOR

The oscillator (Schematic 45002) is a differential input amplifier connected in a potentiometric configuration. Q7 and Q8 are the output transistors. The 1 k, 750 ohm, and 2 k resistors provide the voltage divider for the potentiometric feedback. The gain of the oscillator is automatically controlled by Q9, Q10, Q11 and Q1 in conjunction with the 2 k ohm resistor at the base of Q10. When the output is too high, transistors Q9 and Q10 which act like a rectifier, feed a DC voltage to the gate of the FET (Field Effect Transistor) Q1 and control the potentiometric feedback. This is the AGC circuit. The output level is controlled by the bias set by the 2 k ohm resistor at the base of Q10. The output is at Pin 2 or Pin 3.

The frequency is controlled by a Wien Bridge mounted in the FREQUENCY RANGE switch assembly (see block diagram, Figure 8.1).

4.4 BUFFER AMPLIFIER

The output from the oscillator is fed through the front panel mounted Amplitude and Vernier controls to the input of the buffer amplifier. The buffer amplifier (Schematic 45002) is wired in an operational configuration. The input is fed through a 50 microfarad capacitor to the base of Q1. Q1 and Q2 are connected in cascade manner. When the signal increases, Q1 is turned on which in turn causes Q2 to conduct. Q2 is wired as a common base amplifier providing voltage amplification. Q2 has a collector load consisting of two 1 k resistors in series. Q3, Q4, and Q5 are emitter followers. The operational feedback path is provided by connecting the junction of Q4 and Q5 back to the input capacitor (50 microfarad). The summing junction is at the point where the 50 microfarad input capacitor, the 1 k input resistor, and the 5490 ohm feedback resistor are connected together. Another feedback is connected to the junction of the two 1 k resistors (Q2 collector load). This connection is called boot strapping. It allows Q2 to have a large collector voltage swing. The output is connected to a BNC connector. The shielded cable connects the output to the attenuator assembly and the monitor circuit.

4.5 MONITOR CIRCUIT

The monitor circuit (Schematic 45041) is located electrically at the output of the buffer amplifier. This circuit is a rectifier to provide the DC signal to operate the monitor. This signal conditioner operates in two modes, NORMAL and EXPAND. In the NORMAL mode the output is seen across the 4700 ohm resistor in the emitter circuit of Q1 and is fed directly to the monitor. The output can then be read directly from the monitor scale. Switching to the EXPAND mode does two things: (1) expands the monitor scale by a factor of 20 and (2) shifts the electrical ZERO down scale far enough to permit the expanded reading to be visible on the scale. A set of concentric front panel controls permit the adjustment of this down scale ZERO. The expanded scale may be operated when the output is between 2.8 and 3.2 volts or when in the NORMAL mode the output is indicated to be in the red portion of the monitor scale.

The output of the buffer amplifier is fed through a 365 ohm resistor to the input of the monitor circuit. The input is an integrated circuit containing 4 transistors. Two of these transistors are isolated and 2 are internally wired with an emitter base connection. The monitor circuit utilizes the 2 isolated transistors and externally wires them in a differential manner with the emitters tied together.

The input signal is connected to one of these transistor bases (Pin 6). When the input to Pin 6 rises the transistor is turned on causing the collector (Pin 8) voltage to become more negative. Q2 conducts, charging capacitors 22 uf and

0.22 uf. Q2 acts like an integrator, charging the capacitors in an effort to return the input current of Q2 to zero. Also during the charging, the output of Q2 after being fed to an emitter follower Q1 is returned to the second integrated circuit transistors base (Pin 3) causing that transistor to turn on.

When the input to Pin 6 goes negative, the transistor is turned off. This leaves capacitors 22 uf and 0.22 uf with a high resistance discharge patch, thus the capacitors discharge at a slow rate retaining most of their charge. Through subsequent cycles, the capacitors charge higher until the feedback from the emitter follower Q1 causes both bases (Pins 3 and 6) to be of the same value, preventing further charging of the capacitors. The purpose of the feedback from the emitter follower Q1 is to set a limit to the capacitor's charge so that the output is a representative DC value of the input.

4.6 POWER SUPPLY

The power supply consists of the Transformer Assembly and the Regulator Assembly. Refer to Drawing 45000 for the location of these assemblies in the unit.

The transformer, rectifier, and filter assembly (see Schematic 45002) supplies an unregulated DC voltage to the Regulator Assembly. The configuration of the Regulator Assembly (see Schematic 45011) allows one zener diode to be a standard reference for the +20 V regulated voltage. Each regulator consists of three basic elements: (1) a low-drift wide-band differential amplifier connected in a potentiometric configuration, (2) a two-stage driver amplifier and a series control element.

Regulated -20 volts is applied to a 1 k resistor (R 11) and a zener diode connected in series. The 1 k resistor controls the current flow through the zener diode, allowing the zener to break at 6.3 volts. The voltage developed by the zener diode is applied to the bases of the transistors Q3 and Q6.

Transistors Q1 and Q6 make up the differential amplifier for the -20 volt supply. Resistors R1, R2 and R3 determine the gain of the amplifier and the adjustable range of the -20 volt regulated supply. The output of the differential amplifier is applied to the base of Q10, amplified and then applied to the base of Q8. The signal from the collector of Q8 is applied to the base of the series control element Q5.

Transistors Q2 and Q3 make up the differential amplifier for the +20 volt regulator. Resistors R5, R6 and R7 determine the gain of the amplifier and the adjustable range of the +20 volt regulated supply. Transistors Q7 and Q9 make up the driver amplifier and Transistor Q4 is the series control element for the +20 volt regulated supply.

NOTE: The -20 volt supply controls the current for the reference vernier, and therefore, should always be calibrated first. If the -20 volt supply should fail, it will cause both regulators to appear defective.

SECTION 5
MAINTENANCE

5.1	PREVENTIVE MAINTENANCE
5.2	RECALIBRATION
5.3	PARTS REMOVAL
5.4	POWER TRANSISTOR INSTALLATION
5.5	SELECTED COMPONENTS REPLACEMENT
5.6	SOLDERING
5.7	CALIBRATION
5.8	PERFORMANCE TEST
5.9	TROUBLE SHOOTING
5.10	POSSIBLE PROBLEM AND SOLUTION

5.1 PREVENTIVE MAINTENANCE

The instrument is designed for maintenance free operation and requires no regularly scheduled preventive maintenance. Periodic removal of accumulated dust and dirt from the interior of the unit is recommended. Use only low velocity, dry air or a soft non-metallic brush for this operation.

The exterior, painted surfaces of the instrument are extremely durable and mar resistant. If cleaning is required, use a non-lint producing cloth with soap and water. To prevent internal water damage to the unit, covers that are badly soiled should be removed for cleaning.

5.2 RECALIBRATION

This instrument is calibrated when it leaves the factory. The calibration should be checked at regularly scheduled intervals. Recommended intervals are every 500 hours of operation or every six months. Refer to Section 5.7 for calibration instructions.

5.3 PARTS REMOVAL

If parts removal for repair is necessary, refer to the suggested soldering procedure outlined in Section 5.6. After defective parts have been replaced, refer to Section 5.7 for calibration and specification check.

5.4 POWER TRANSISTORS INSTALLATION

The power transistors for the DC power supply are mounted on the Regulator Board Assembly (see Drawing 45010). The transistors are not electrically insulated from the heat sinks but a thin film of silicon grease (such as Dow Corning DC-4) must be applied to the transistor and spacers where they come in contact with the heat sink. Incorrectly installed, the transistors may overheat causing them to fail.

5.5 SELECTED COMPONENTS REPLACEMENT

In some instances the value of some components are selected in production to avoid the use of calibration adjustments. These components are marked and tabulated on the schematic diagrams (see Section 8) and it should not be necessary to alter their values throughout the life of the instrument. If replacement part does not restore proper operation of the instrument, the factory or the nearest Preston Scientific representative should be contacted for assistance.

5.6 SOLDERING

Only experienced technicians should replace soldered parts because printed circuits are vulnerable to excess heat as are many diodes and transistors. The following recommendations should be taken into consideration when replacing soldered parts:

(a) Use small diameter rosin core solder and a 35 to 40 watt iron with a wedge or pointed tip; 1/16 to 1/8 inch wide. The tip must be clean and properly tinned with excess solder removed.
(b) Obviously defective parts may be clipped out so their leads can be conveniently unsoldered from the board.
(c) Solder only on the circuit side of the board; not on the component side.
(d) Apply the tip of the iron directly to the solder joint, at the eyelet, just long enough for the solder to flow.
(e) Avoid bringing the iron into contact with the circuit board; overheating will cause the conductor to lift from the board.
(f) Use a solder sipper (or some other means) to remove excess solder first when unsoldering a lead, particularly where a lead is bent over so it can be straightened before it is pulled out.
(g) When a lead is free, clean the hole and remove excess solder, using a solder sipper or a sharp object such as a toothpick or pointed tool.
(h) To prevent heat damage when soldering heat sensitive components, use a heat sink or long nose pliers to grip the lead between the part and the board.
(i) Leave a small space between the circuit board and the part when soldering heat dissipating components such as resistors.
(j) Clean the area thoroughly after soldering.

5.7 CALIBRATION

AC power must be turned off before removing or installing printed circuit boards. The calibration paragraphs must be done in the order listed to properly calibrate the instrument.

5.7.1 RECOMMENDED TEST EQUIPMENT

MODEL	VENDOR	DESCRIPTION
340A	Precision Standard Corp.	AC-DC Differential Voltmeter
11051A	Hewlett Packard	Converter
11049	Hewlett Packard	Converter
--	Preston Scientific Inc.	Notch Filter
8300	Preston Scientific Inc.	Differential Amplifier
X-MOD 704	Preston Scientific Inc.	Voltage Amplifier
X-MOD 706	Preston Scientific Inc.	Amplifier/Null Meter
X-MOD 722A	Preston Scientific Inc.	DVM
--	Rustrak	Chart Recorder
545B	Tektronix	Oscilloscope
Type B	Tektronix	Preamplifier
5243L	Hewlett Packard	Frequency Counter
X-MOD 135	Preston Scientific Inc.	Waveform Source
--	--	Metered Variac
X-MOD 305	Preston Scientific Inc.	Sequence/Register
X-MOD 708	Preston Scientific Inc.	Relay Switch Module
--	Preston Scientific Inc.	Precision Attenuator/Level Detector
--	Preston Scientific Inc.	Flatness Tester

5.7.2 POWER SUPPLY CALIBRATION

(a) Connect a DC voltmeter between Pins 8 or 9 (low) and Pin 16 (high) on the regulator board connector.
(b) Adjust -ADJ (R2) for -20 $\pm$0.1 VDC.
(c) Connect the DC voltmeter between Pins 8 or 9 (low) and Pin 1 (high) on the regulator board connector.
(d) Adjust +ADJ (R6) for +20 $\pm$0.1 VDC.

5.7.3 OSCILLATOR

(a) Remove the top cover by removing the retaining screws (8) and the top cover of the oscillator box.
(b) Set the FREQUENCY RANGE switch to 10 k.
(c) Set the FREQUENCY VERNIER to 1.
(d) Set the TEST-OPERATE switch located behind the meter to TEST.
(e) Adjust the potentiometer (200 ohms) on the D (drain) of Q1 such that the indication on the monitor is at mid-scale.
(f) Set the OUTPUT ATTENUATOR to 3 volts rms.
(g) Connect a DC voltmeter with a 4.7 k in series to Pin 2 or Pin 3 and ground of the oscillator board (Assembly 45019).
(h) Adjust the 200 ohm potentiometer that is connected to the S (source) of Q2 and Q3 for zero volts.
(i) Connect an oscilloscope to Pin 2 or Pin 3 and ground. Adjust the 2 k ohm resistor at the base of Q10 for 5 volts peak-to-peak.

Note: Final amplitude adjustment will be made later with this same pot.

5.7.4 CAPACITOR TRIMMER ASSEMBLY

(a) If the dial or capacitor assembly has been removed, the dial will have to be aligned with the variable capacitor. Loosen the screws on the plastic shaft at the dial end. Adjust the dial such that when the capacitor is at the full counterclockwise position that the dial positioning dot (located at each end of the scale) is aligned with the mark on the front panel. Tighten the shaft screw.
(b) Set the FREQUENCY VERNIER to 1.0.
(c) Connect a counter to the BNC output connector.
(d) Checking the frequency, switch the FREQUENCY RANGE switch from maximum to minimum.
(e) The trimmer potentiometers located inside the oscillator box are designed to bring the frequency down if it is high. If any of these frequencies are lower than the dial setting, use the lowest frequency and readjust the dial by loosening the plastic shaft at the dial end and realigning the dial to the proper frequency. All the other frequencies will now be higher than the desired frequency and may be adjusted with the trimmer potentiometers. The trimmer potentiometers are located near the front of the capacitor box on a small circuit board. The pots are mounted in ascending frequencies from left to right.
(f) Observe the monitor and insure that it is in center scale $\pm$10%.
(g) Replace the top to the capacitor box.
(h) Set the FREQUENCY VERNIER to 10.0.

(i) The frequency may now be adjusted at the high end of the vernier by a combination of two capacitors for each FREQUENCY RANGE switch setting. These trimmer capacitors are located on the small printed circuit board in the capacitor box and may be reached through the appropriate hole in the top.
These trimmer capacitors are in staggered pairs starting with the high frequency at the right.

(j) Adjust the two capacitors, associated with the particular frequency range, alternately. One of these capacitors will raise the frequency and raise the amplitude on the monitor. The other will raise the frequency but lower the amplitude. Adjust them for the right frequency and amplitude (center scale).

5.7.5 FREQUENCY ACCURACY CHECK

(a) Set the TEST-OPERATE switch to OPERATE.
(b) Follow the steps outlined in Section 5.8.1.

5.7.6 MONITOR CIRCUIT ADJUSTMENT

(a) Set the frequency to 1 kHz.
(b) Connect an AC dvm to the output.
(c) Set the output to 3.16 volts rms as read on external dvm.
(d) Observe the monitor and adjust the 5 k potentiometer in the monitor circuit to read full scale on the monitor (1.0 volts on the 1 volt scale).
(e) Set the output at the low end of the red portion of the 3 volt scale.
(f) Adjust the NORMAL-EXPAND switch to EXPAND. Set the 250 ohm potentiometer (located on the Monitor (Assembly 45040, Schematic 45041) such that the meter reads at the low end of the scale. (Note: the REF SET should be at the CCW position.
(g) Set the NORMAL-EXPAND switch to NORMAL.
(h) Adjust the output to the top end of the red portion of the 1 volt scale.
(i) Set the NORMAL-EXPAND switch to EXPAND and adjust the 250 ohm potentiometer to bring it on scale at the top.

NOTE: (e), (f), (g), (h), and (i) are REF SET calibration adjustment and may have to be repeated.

(j) Set the output to 3.002 volts as measured on an external dvm.
(k) Adjust the front panel REF SET such that the monitor indication is at the low end of the scale.
(l) Increase the output to 3.16 volts as indicated on the external dvm.
(m) Adjust the 100 ohm potentiometer (sensitivity) for full scale.

5.7.7 ATTENUATOR ACCURACY

(a) Check the ATTENUATOR accuracy per the steps outlined in Section 5.8.3.
(b) If adjustment is necessary, resistors must be added to the attenuator assembly. They are connected to the terminals provided.

5.7.8 DISTORTION CHECK

(a) Follow the steps outlined in Section 5.8.2.
(b) Adjust the DC balance potentiometer on the buffer amplifier for minimum distortion at 10 MHz.

5.7.9 FLATNESS ADJUSTMENT (Test Setup Per Figure 8.5)

(a) Set the ATTENUATOR to the highest output position.
(b) Adjust the trimmer capacitor on the buffer amplifier such that the 10 MHz amplitude is the same as the 1 kHz amplitude.

5.7.10 MONITOR FLATNESS (Refer to Test Procedure, Section 5.8.9)

(a) Set the trimmer capacitor on the monitor circuit (Assembly 45040) such that the output at 10 MHz as observed on the monitor meter is the same as the output at 1 kHz.

5.7.11 ATTENUATOR FLATNESS (Test Setup Per Figure 8.5)

(a) Check the ATTENUATOR flatness at each attenuator step.
(b) If adjustment is necessary, capacitors must be added to the attenuator assembly. They are connected to the terminals provided.

5.7.12 FINAL AMPLITUDE ADJUSTMENT

(a) If, after calibration the amplitude cannot reach 3.16 volts (50 ohm load) at all frequencies, adjust the 2 k ohm potentiometer at the base of Q10 of the osciallator.

5.8 INTRODUCTION

The following is the acceptance test procedure for the X-MOD 134A Sine Wave Oscillator. Refer to conformance Specification No. MIS-10224, Paragraphs 3.3.3 through 3.3.12 for acceptance parameters. The following acceptance procedure will start with Paragraph 3.3.3 referring directly to the parameters in the above conformance specification.

5.8.1 FREQUENCY ACCURACY (Reference Paragraph 3.3.3)

(a) Terminate the output of the oscillator with 50 ohms, ±1%, on the 50 ohm output.
(b) Connect a frequency counter to the terminated output.
(c) Select 0.3 volts with the OUTPUT ATTENUATOR, and set the AMPLITUDE VERNIER to X1.
(d) Select X10 with the MULTIPLIER switch.
(e) Turn on the unit under test and immediately check the dial frequency accuracy for variation per Table 5.1. Check 10 Hz, 3 kHz, and 10 MHz first.

TABLE 5.1

MULTIPLIER	FREQUENCY BAND	CHECK POINTS	DIAL TOLERANCE
X10	10 Hz to 100 Hz	10 Hz, 30 Hz, 100 Hz	±3%
X100	100 Hz to 1 kHz	100 Hz, 300 Hz, 1 kHz	±2%
X1 k	1 kHz to 10 kHz	1 kHz, 3 kHz, 10 kHz	±2%
X10 k	10 kHz to 100 kHz	10 kHz, 30 kHz, 100 kHz	±2%
X100 k	100 kHz to 1 MHz	100 kHz, 300 kHz, 1 MHz	±2%
X1 M	1 MHz to 10 MHz	1 MHz, 3 MHz, 10 MHz	±3%

Allow thirty-minute warm up and repeat test of frequencies of 10 Hz, 3 kHz and 10 MHz only and with a +10% line and a -10% line variation.

5.8.2 DISTORTION (Reference Paragraph 3.3.5)

(a) Connect oscillator to NOTCH FILTER as shown in Figure 8.2.
(b) Use 50 ohm output.
(c) Set the X-MOD Oscillator to a frequency of 10 MHz.
(d) Connect to the 10 kHz - 10 MHz calibrator jacks and adjust the amplitude of the output for 3.16 volts as indicated on the monitor (1.0 on 1 volt scale of meter). Switch to EXPAND and set REF SET to center scale of meter.
(e) Adjust the gain of the X-MOD 706 Amplifier for a reading of at least 200 counts on the X-MOD 722A DVM. This is the Reference Reading.

(f) Repeat steps (c) and (d) for a frequency below 10 kc using the 10 Hz - 3 kHz calibrator position.
(g) Adjust the gain of the X-MOD 704 Amplifier for a reading equal to the Reference Reading set in step (e).
(h) Check the sine wave distortion for the following frequencies:

10 Hz	300 Hz	10 kHz	300 kHz	7 MHz
30 Hz	1 kHz	30 kHz	1 MHz	10 MHz
100 Hz	3 kHz	100 kHz	5 MHz	

Note 1: The Reference Reading of step (e) represents a distortion of 1% for frequencies of 10 Hz to 1 MHz and 2% for frequencies of 5 MHz to 10 MHz.
Note 2: Each time the NOTCH FILTER Frequency is changed, adjust the oscillator for null and adjust the amplitude for 3.16 volts as indicated on the monitor expanded scale.

5.8.3 ATTENUATOR ACCURACY (Reference Paragraph 3.3.11)

(a) Connect the oscillator to the test setup shown in Figure 8.6.
(b) Use the 50 ohm output.
(c) Select X1 k with the MULTIPLIER switch and adjust the oscillator frequency to 1 kHz as indicated by the FREQUENCY dial.
(d) Select 3.0 VOLTS with the OUTPUT ATTENUATOR.
(e) Set the AMPLITUDE vernier to 1.0 on the monitor (1 volt scale), switch to expand, and adjust reference to 0%.
(f) Set the PRECISION DIVIDER to +20 db (attenuation of 90 db) and switch to ATT TEST.
(g) Measure the output for each of the following ATTENUATOR positions.

ATTENUATOR SETTING AND PRECISION ATTENUATOR SETTING	PRECISION ATTENUATOR	MAXIMUM ERROR
+20 db	90 db	0 (set point)
+10 db	80 db	±1%
0	70 db	±1%
-10	60 db	±1%
-20	50 db	±1%
-30	40 db	±1%
-40	30 db	±1%
-50	20 db	±1%
-60	10 db	±2.3%
-70	0 db	±2.3%

5.8.4 FREQUENCY STABILITY (Reference Paragraph 3.3.4)

(a) Turn on X-MOD 134A and allow thirty minutes for warm up.
(b) Terminate one output with the proper lead.
(c) Select 0.3 volts with OUTPUT ATTENUATOR and set the AMPLITUDE VERNIER to X1.
(d) Select X1 M with the MULTIPLIER switch.
(e) Connect a frequency counter to the terminated output.
(f) Adjust the frequency output to 1 MHz.
(g) Measure and record frequency within ±1 Hz.
(h) After five minutes, measure and record the output frequency within ±1 Hz.
(i) Subtract the low frequency from the high frequency.
(j) The difference between the two frequencies should be less than 100 Hz; i.e., 20 ppm/minute x five minutes = 100 ppm at 1 MHz = 100 Hz.

5.8.5 OUTPUT POWER (Reference Paragraph 3.3.7)

(a) Set OUTPUT ATTENUATOR for maximum output voltage; set the AMPLITUDE VERNIER to maximum.
(b) Select 1 k with the MULTIPLIER switch.
(c) Adjust the oscillator frequency for 1 kHz as indicated by the frequency dial.
(d) Terminate the 50 ohm output with a 50 ohm load and measure the output voltage with an AC-DC Differential Voltmeter.
(e) The output voltage should be greater than 3.16 volts.
(f) Remove the 50 ohm load from the 50 ohm output and connect a 600 ohm load across the 600 ohm output.
(g) Measure the output voltage with an AC-DC Differential Voltmenter.
(h) The output voltage should be equal to or greater than 3.16 volts.
(i) Measure the output voltage with the output monitor after each termination is removed from its output.
(j) The output voltage should double in each case.

5.8.6 OUTPUT VOLTAGE (Reference Paragraph 3.3.8)

(a) Successful completion of Paragraph 3.3.7 (Output Power) will confirm the maximum output voltage.

5.8.7 AMPLITUDE INSTABILITY (Reference Paragraph 3.3.9)

(a) Place the oscillator in a constant temperature chamber.
(b) Select 3.0 VOLTS with the OUTPUT ATTENUATOR.
(c) Turn AMPLITUDE VERNIER to 3.16 volts (1.0 on monitor 1 volt scale).
(d) Connect to setup as shown in Figure 8.4.
(e) Set X-MOD 305 to appropriate number of steps depending on number of oscillators being tested, and set X-MOD 135 to approximately 0.001 Hz.

(f) Select 1 k with the MULTIPLIER switch and adjust the oscillator frequency to 1 kHz.
(g) Allow a thirty-minute warm up after reaching thermal stability, adjust the AMPLITUDE VERNIER to center the trace of each oscillator on the recorder.
(h) After twelve hours at constant temperature, the amplitude shall have a peak-to-peak excursion of less than 0.2% (±0.1%).

5.8.8 OUTPUT MONITOR ACCURACY (Reference Paragraph 3.3.10.1)

(a) Connect oscillator to the test setup shown in Figure 8.6.
(b) Use the 50 ohm output and terminate with a 50 ohm ±0.1% resistance.
(c) Set the AMPLITUDE VERNIER to X1 and the attenuator switch to 3.0.
(d) Set the precision divider to the Meter test positions.
(e) Measure output on the Meter to a resolution of ±0.2%.
(f) Adjust the AMPLITUDE VERNIER to the following amplitudes as indicated by the monitor, setting the precision attenuator to the appropriate positions of the METER TEST switch. Measure the deviation from the 1.0 position.

MONITOR READING	MAXIMUM ERROR
1.0	0% (set point)
0.8	±2%
0.6	±2%
0.4	±2%
0.2	±2%

5.8.9 OUTPUT MONITOR FLATNESS (Reference Paragraph 3.3.10.2)

(a) Connect the oscillator as shown in Figure 8.5.
(b) Use the 50 ohm output.
(c) Select the +20 dbm output (3.0 volts) with the OUTPUT ATTENUATOR of the oscillator.
(d) Select the +20 db position on the flatness tester.
(e) Adjust the oscillator AMPLITUDE to give a DVM reading of between 1700 and 1800 counts.
(f) Set the frequency per Table 3 and readjust the oscillator AMPLITUDE to the same monitor reading established in step (e).
(g) Record the DVM reading for each frequency, and apply the calibration correction to each reading.
(h) Using the expanded scale capability, determine the reference deviation by changing the oscillator AMPLITUDE 2%.
(i) The difference between the highest and lowest corrected readings shall be less than twice the reference deviation (±2%).

(j) Delete the reading for the highest and lowest frequency. The difference between the remaining highest and lowest corrected readings shall be less than the reference deviation (±1%).

TABLE 3

OSCILLATOR FREQUENCY	FLATNESS DEVIATION
10 Hz	±2%
40 Hz	±1%
4 kHz	±1%
100 kHz	±1%
7 MHz	±2%
4 MHz	±1%
10 MHz	±2%

5.8.10 EXPANDED SCALE FLATNESS (Reference Paragraph 3.3.10.3)

(a) Connect the oscillator as shown in Figure 8.5.
(b) Use the 50 ohm output.
(c) Select the +20 dbm output (3.0 volts) with the OUTPUT ATTENUATOR of the oscillator.
(d) Select the +20 db position on the flatness tester.
(e) Adjust the oscillator AMPLITUDE to give a DVM reading of between 1700 and 1800 counts.
(f) Set the frequency per Table 3 and readjust the oscillator AMPLITUDE to the same monitor reading established in step (e) using the X20 expansion.
(g) Record the DVM reading for each frequency, and apply the calibration correction to each reading.
(h) The difference between the highest and lowest corrected reading shall be less than the reference deviation (±0.25%).
(i) Switch the oscillator and flatness tester to ATTENUATOR positions +10, 0, -10, -20, -30, -40, and -50. Repeat steps (e) through (h) for each ATTENUATOR position.
(j) Using the procedure of step (c) through (e), determine the reference deviation by changing the oscillator AMPLITUDE 0.5%.

5.8.11 OUTPUT IMPEDANCE (Reference Paragraph 3.3.12)

Satisfactory completion of Paragraph 3.3.7 (Output Power) confirmed the output impedance of each output; i.e., output doubled when the termination was removed.

5.8.12 HUM AND NOISE (Reference Paragraph 3.3.6)

(a) Set the oscillator to a frequency of 1 kc.
(b) Using the test setup and procedure for distortion (Figure 8.2), connect an oscilloscope, as shown in Figure 8.3, to the MONITOR POINT, and adjust the oscilloscope for 1 cm peak-to-peak deflection of the calibration signal. Sync the oscilloscope on the 600 ohm output of the X-MOD Oscillator.
(c) Select the 1 kHz NOTCH FILTER and adjust the oscillator for null.
(d) Increase the sensitivity of the oscilloscope and insure that the peak-to-peak non-synchronous signal is less than 1/20th of the calibration amplitude.

Note: This signal represents the hum and noise, and 1/20th of the calibration amplitude is 0.05%.

5.9 TROUBLE SHOOTING

Refer to the operation check by following the steps in Section 3.2 of this manual. Use the procedures in Section 5.8 to verify calibration. A replaced or aged component may cause an apparent malfunction that is readily corrected by a calibration adjustment. Test equipment and cables are frequent sources of trouble and should be double checked. If a problem does exist, refer to Section 4 for the theory of operation and then to Section 10 for common malfunctions and their solution.

5.10 POSSIBLE PROBLEM AND SOLUTION

PROBLEM: Loss of power.

CHECK: First check to see that the line cord is properly connected and making contact with both the power source and the instrument. Check to see if the fuse is blown or of an incorrect value.

PROBLEM: Ripple on output.

CHECK: Check the ripple with an oscilloscope on Pin 6 (+ voltage unregulated) and Pin 11 (- voltage unregulated) of the regulator board (Assembly 45010). The ripple should be approximately 0.5 volts peak-to-peak. If this ripple is high, replace the filter capacitors. If the ripple is nominal, observe the ripple at the regulator output (+20 volts, Pin 1 and -20 volts, Pin 16). The ripple at these points should be less than 1 millivolt. If this ripple is high, check for a defective part on the regulator board.

PROBLEM: No output.

CHECK: If no output appears at the connectors, check the output monitor (NORMAL mode) and observe if an indication is present. If there is no indication, turn the FREQUENCY VERNIER to 1.0 (capacitor fully meshed) and set the OUTPUT ATTENUATOR for maximum output. The instrument should start to oscillate. If the output is not present, remove the top cover. Connect an oscilloscope to the BNC on the buffer amplifier. If there is no signal at the output of the buffer, check for a signal at Pin 2 or Pin 3 of the oscillator. If an output is present at the oscillator, the trouble is in the buffer amplifier.

PROBLEM: No meter indication (output at connectors) or constant mid-scale reading.

CHECK: There are 4 possibilities: (1) either the meter movement is damaged, (2) the NORMAL/EXPAND switch is in the EXPAND mode and the output is not high enough, (3) the monitor circuit mounted in the attenuator box has a defective part, or (4) the TEST-OPERATE switch is in the TEST position.

SECTION 6
REPLACEMENT PARTS

6.1 REPLACEMENT PARTS

6.2 ORDERING INFORMATION

MANUFACTURER

ABBR.	COMPANY NAME	FEDERAL SUPPLY CODE
A.B.	ALLEN BRADLEY	
AE.	ARCO-ELMENTOR	
BKN.	BECKMAN	
BRN.	BOURNS	
C.D.E.	CORNELL DUBILIER	
C&K	C & K	
CRN.	CORNING	
C.T.S.	CHICAGO TELEPHONE	
ERIE	ERIE	
ETA.	ELECTRA	
HUG.	HUGHES	
I.R.	INTERNATIONAL RECTIFIER	
I.R.C.	I.R.C.	
MLR.	MILLER	
MOT.	MOTOROLA	
PSN.	PRESTON SCIENTIFIC INC.	
RAY.	RAYTHEON	
RCA	RCA	
SPG.	SPRAGUE	
SWC.	SWITCH CRAFT	
SYL.	SYLVANIA	
T.I.	TEXAS INSTRUMENTS	
U.C.	UNION CARBIDE	
WEL.	WELWEN	

REF. ASSY.	DESCRIPTION	VALUE	PRESTON PART NO.	MANUFACTURER	MANUFACTURER PART NO./CAT. NO.
40191	Resistor	60.4 1/4 w 1%	Box 394N	CRN.	NC5-60R4F
40191	Resistor	365 1/4 w 1%	Box 401L	CRN.	NC5-3650F
45015	Transformer		45036	PSN.	45036
45015	Capacitor Var		30810	PSN.	30810
45015	Capacitor	5 uf 100 V	25054	PSN.	25054
45015	Capacitor	1300 uf 50 V	Box 155A	SPG.	36D-132GO50AA2A
45015	Capacitor	0.001	Box 76	AE.	DM15-102J
45015	Potentioneter		45038	PSN.	45038
45015	Switch (slide)		Box 765C	SWC.	46206L
45015	Rectifier		Box 245A	MOT.	MDA 942 A-2
45006	Meter Movement		30546-19	PSN.	30546-19
45006	Switch (Toggle)		Box 763	C&K	7201
45007	Switch (Slide)		Box 765B	SWC.	46206LF

EF. ASSY.	DESCRIPTION	VALUE	PRESTON PART NO.	MANUFACTURER	MANUFACTURER PART NO./CAT. NO.
40212	Resistor	105 1/4 w 1%	Box 397N	CRN.	NC5-1050F
40212	Resistor	100 1/4 w 1%	Box 397M	CRN.	NC5-1000F
40212	Resistor	71.5 1/4 w 1%	Box 394R	CRN.	NC5-71R5F
40212	Resistor	61.9 1/4 w 1%	Box 394P	CRN.	NC5-61R9F
40212	Resistor	52.3 1/4 w 1%	Box 394M	CRN.	NC5-52R3F
40212	Resistor	49.9 1/4 w 1%	Box 394L	CRN.	NC5-49R9F

REF. ASSY.	DESCRIPTION	VALUE	PRESTON PART NO.	MANUFACTURER	MANUFACTURER PART NO./CAT. NO.
45010	Transistor	2N3906	Box 846A	MOT.	2N3906
45010	Transistor	2N3904	Box 846	MOT.	2N3904
45010	Transistor	2N1132	Box 824	MOT.	2N1132
45010	Transistor	2N1711	Box 828	RAY.	2N1711
45010	Transistor	2N4921	Box 846C	MOT.	2N4921
45010	Diode Zener	1N753A	Box 234	MOT.	1N753A
45010	Capacitor	1000 pf	Box 76	AE.	DM15-102
45010	Capacitor	10 uf 25 V	Box 142	C.D.E.	NLW-10-25
45010	Capacitor	2 uf 50 V	Box 116	C.D.E.	NLW-2-50
45010	Potentiometer	5k	Box 351	BRN.	3067P-1-502
45010	Resistor	47.5	Box 472	I.R.C.-ETA.	RN60D-4752F
45010	Resistor	10	Box 520	A.B.	CB 1001
45010	Resistor	10k	Box 547	A.B.	CB 1041
45010	Resistor	90.9	Box 477	I.R.C.-ETA.	RN60D-9042F
45010	Resistor	20k	Box 465	I.R.C.-ETA.	RN60D-2002F
45010	Resistor	49.9	Box 473	ETA.	RN60D-4992F
45010	Resistor	1k	Box 531	A.B.	CB 1021
45010	Resistor	2.2k	Box 533	A.B.	CB 2221
45010	Resistor	22k	Box 541	A.B.	CB 2231

REF. ASSY.	DESCRIPTION	VALUE	PRESTON PART NO.	MANUFACTURER	MANUFACTURER PART NO./CAT. NO.
45019	Resistor	1k 1/4 w 1%	Box 409	ETA.	MFSC-D-1001F
45019	Resistor	750 1/4 w 1%	Box 407	ETA.	MFSC-D-7500F
45019	Resistor	499 1/4 w 1%	Box 402	I.R.C.-ETA.	RN60D-4990F
45019	Resistor	100 1/4 w 1%	Box 397	I.R.C.-ETA.	RN60D-1000F
45019	Resistor	1M 1/4 w 10%	Box 551	A.B.	CB 1051
45019	Resistor	100k 1/4 w 10%	Box 547	A.B.	CB 1041
45019	Resistor	22k 1/4 w 10%	Box 541	A.B.	CB 2231
45019	Resistor	10k 1/4 w 10%	Box 538	A.B.	CB 1031
45019	Resistor	6800 1/4 w 10%	Box 537	A.B.	CB 6821
45019	Resistor	4700 1/4 w 10%	Box 536	A.B.	CB 4721
45019	Resistor	1500 1/4 w 10%	Box 532	A.B.	CB 1521
45019	Resistor	1k 1/4 w 10%	Box 531	A.B.	CB 1021
45019	Resistor	470 1/4 w 10%	Box 529	A.B.	CB 4711
45019	Resistor	220 1/4 w 10%	Box 527	A.B.	CB 2211
45019	Resistor	100 1/4 w 10%	Box 525	A.B.	CB 1011
45019	Resistor	47 1/4 w 10%	Box 523	A.B.	CB 4701
45019	Resistor	22 1/4 w 10%	Box 521	A.B.	CB 2201
45019	Resistor	10 1/4 w 10%	Box 520	A.B.	CB 1001
45019	Resistor	2200 1/4 w 10%	Box 533	A.B.	CB 2221
45019	Resistor	47k 1/4 w 10%	Box 554	A.B.	CB 4731
45019	Diode Zener	1N5248B	Box 244 J	MOT.	

REF. ASSY.	DESCRIPTION	VALUE	PRESTON PART NO.	MANUFACTURER	MANUFACTURER PART NO./CAT.NO.
45019	Transistor	UC 200	9924	U.C.	UC 200
45019	Transistor	UC 200	9923	U.C.	UC 200
45019	Transistor	2N3904	Box 846	MOT.	2N3904
45019	Transistor	2N3906	Box 846A	MOT.	2N3906
45019	Diode	1N5234B	Box 248H	MOT.	1N5233
45019	Diode	1N4148	Box 239	HUG.	1N4148
45019	Diode	1N281	Box 231	SYL.	1N281
45019	Diode	1N5236B	Box 248G	MOT.	1N5236B
45019	Diode	1N5240B	Box 248J	MOT.	1N5240B
45019	Potentiometer	2k	Box 347	BRN.	3067P-1-202
45019	Potentiometer	200	Box 343B	BKN.	62PR200
45019	Capacitor	0.0047 uf	Box 87	AE.	6DP-1-472
45019	Capacitor	100 uf 3 V	Box 146A	C.D.E.	NLW-100-3
45019	Capacitor	22 uf 15 V	Box 144	SPG.	CS13BD226K
45019	Capacitor	10 uf 25 V	Box 142	C.D.E.	NLW-10-25
45019	Capacitor	2.2 uf 35 V	Box 133	SPG.	CS13BF-22SF
45019	Capacitor	0.22 uf	25034	PSN.	25034
45019	Capacitor	0.022 uf	Box 98	AE.	P7-223-11
45019	Capacitor	1000 pf	Box 76	AE.	DM15-102J
45019	Capacitor	220 pf	Box 67	AE.	DM15-221J
45019	Capacitor	100 pf	Box 62	AE.	DM15-101J
45019	Capacitor	5 pf	Box 50	AE.	DM15-050D
45019	Capacitor	3 pf	Box 48	AE.	DM15-030-M3DF
45019	Resistor	499k 1/4 w 1%	Box 484	CRN.	MFSC-D-4993F
45019	Resistor	100k 1/4 w 1%	Box 478	ETA.	RN60D-1003F
45019	Resistor	49.9k 1/4 w 1%	Box 473	ETA.	RN60D-4992F
45019	Resistor	17.4k 1/4 w 1%	Box 462	ETA.	RN60D-1742F
45019	Resistor	7500 1/4 w 1%	Box 451F	ETA.	RN60D-7501F
45019	Resistor	2490 1/4 w 1%	Box 427	ETA.	RN60D-2491F
45019	Resistor	2k 1/4 w 1%	Box 422	ETA.	RN60D-2001F

REF. ASSY.	DESCRIPTION	VALUE	PRESTON PART NO.	MANUFACTURER	MANUFACTURER PART NO./CAT. NO.
45032	Transistor	2N3906	Box 846	MOT.	2N3904
45032	Transistor	2N2905	Box 838B	T.I.	2N2905
45032	Transistor	2N2219A	Box 830B	MOT.	2N2219A
45032	Diode Zener	1N5232B	Box 244H	MOT.	1N5232B
45032	Diode Zener	1N5236B	Box 248G	MOT.	1N5236B
45032	Choke	36 uh	Box 11A	MLR.	9210-54
45032	Capacitor Var	2-8 pf	Box 79	ERIE	538-01189A
45032	Capacitor	1000 uf 6 V	Box 155C	C.D.E.	BR1000-6
45032	Capacitor	50 uf 25 V	Box 145C	C.D.E.	NLW 50-25
45032	Capacitor	100 uf 25 V	Box 145	SPG.	TE 1157-1
45032	Capacitor	1 uf	25045	PSN.	25045
45032	Capacitor	10 uf 25 V	Box 142	C.D.E.	NLW 10-25
45032	Capacitor	0.1 uf	Box 110	AE.	P7-104-11
45032	Capacitor	1000 pf	Box 76	AE.	DM15-102
45032	Capacitor	100 uf 15 V	Box 147	C.D.E.	NLW 100-15
45032	Potentiometer	5k	Box 349B	C.T.S.	CTS U201
45032	Resistor	220 1/4 w 10%	Box 527	A.B.	CB 2211
45032	Resistor	680 1 w 10%	Box 603A	A.B.	CB 6811
45032	Resistor	100 1/2 w 1%	Box 490N	I.R.C.-ETA.	RN65D-1000F
45032	Resistor	34.8 1/2 w 1%	Box 489X	I.R.C.-ETA.	RN65D-34R8F
45032	Resistor	29.4k 1/4 w 1%	Box 468	I.R.C.-ETA.	RN60D-2942F
45032	Resistor	18.2 1/4 w 1%	Box 463	I.R.C.-ETA.	RN60D-1822F
45032	Resistor	6340 1/4 w 1%	Box 450	I.R.C.-ETA.	RN60D-6341F
45032	Resistor	10k 1/4 w 1%	Box 456	I.R.C.-ETA.	RN60D-1002F
45032	Resistor	4990 1/4 w 1%	Box 445	I.R.C.-ETA.	RN60D-4991F
45032	Resistor	1k 1/4 w 1%	Box 409	ETA.	RN60D-1001F
45032	Resistor	200 1/4 w 1%	Box 399	CRN.	RN60D-2000F
45032	Resistor	1k 1/4 w 10%	Box 531	A.B.	CB 1021
45032	Resistor	47 1/4 w 10%	Box 523	A.B.	CB 4701
45032	Resistor	1500 1/4 w 10%	Box 532	A.B.	CB 1521

REF. ASSY.	DESCRIPTION	VALUE	PRESTON PART NO.	MANUFACTURER	MANUFACTURER' PART NO./CAT. NO.
45037	Resistor	3.4M 1/4 w 1%	Box 384G	WEL.	M12-3.4M
45037	Resistor	34M 1 w 1%	Box 602C	I.R.C.	DC-2
45037	Resistor	340k 1/4 w 1%	Box 481C	I.R.C.-ETA.	RN60D-3403F
45037	Resistor	34k 1/4 w 1%	Box 469A	I.R.C.-ETA.	RN60D-3402F
45037	Resistor	3400 1/4 w 1%	Box 437A	I.R.C.-ETA.	RN60D-3401F
45037	Resistor	332 1/4 w 1%	Box 401E	I.R.C.-ETA.	RN60D-3320F
45026	Capacitor	2-8 pf	Box 79	ERIE	538-011 89A
45026	Capacitor	3-15 pf	Box 78	ERIE	538-011 110D
45026	Capacitor	9-35 pf	Box 77	ERIE	538-011 94R
45026	Potentiometer	50	Box 340U	BKN.	62 PR 50
45026	Potentiometer	500	Box 344E	I.R.C.-C.T.S.	X201R-501B
45026	Potentiometer	5k	Box 349C	C.T.S.	CTS X-201
45026	Potentiometer	50k	Box 371	C.T.S.	X-201
45026	Potentiometer	500k	Box 373Z	I.R.C.-C.T.S.	X-201R-504B

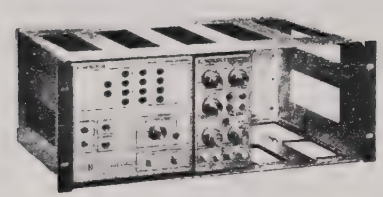
REF. ASSY.	DESCRIPTION	VALUE	PRESTON PART NO.	MANUFACTURER	MANUFACTURER PART NO./CAT. NO
45040	Transistor	2N3904	Box 846	MOT.	2N3904
45040	Transistor	2N3906	Box 846A	MOT.	2N3906
45040	Integrated Circuit	CA 3018	Box 848G	RCA	CA 3018
45040	Diode	IN 4148	Box 239	SYL.	IN 4148
45040	Diode	IN 5240B	Box 248J	MOT.	IN 5240B
45040	Diode	IN 749A	Box 232B	I.R.	IN 749A
45040	Capacitor	9-13 pf	Box 77	ERIE	538-011-94R
45040	Capacitor	22 uf 15 V	Box 144	SPG.	GS13AD220M
45040	Capacitor	10 uf 25 V	Box 142	C.D.E.	NLW 1025
45040	Capacitor	1 uf	25046	PSN.	25046
45040	Capacitor	0.22 uf	25033	PSN.	25033
45040	Potentiometer	5k	Box 349C	C.T.S.-I.R.C.	CTS X-201
45040	Potentiometer	100	Box 341B	C.T.S.-I.R.C.	CTS X-201
45040	Potentiometer	250	Box 343C	C.T.S.-I.R.C.	CTS X-201-R251B
45040	Resistor	17.4k	Box 462	I.R.C.-ETA.	RN60D-1742F
45040	Resistor	301	Box 401B	CRN.	MF5C-D-3010F
45040	Resistor	1k	Box 409	ETA.	MF5C-D-1001F
45040	Resistor	16.9k	Box 461	I.R.C.-ETA.	RN60D-1692F
45040	Resistor	47	Box 523	A.B.	CB 4701
45040	Resistor	2.2m 1/4 w 10%	Box 553	A.B.	CB 2251
45040	Resistor	1m 1/4 w 10%	Box 551	A.B.	CB 1051
45040	Resistor	100k 1/4 w 10%	Box 547	A.B.	CB 1041
45040	Resistor	10k 1/4 w 10%	Box 538	A.B.	CB 1031
45040	Resistor	4700 1/4 w 10%	Box 536	A.B.	CB 4721
45040	Resistor	3900 1/4 w 10%	Box 535A	A.B.	CB 3921
45040	Resistor	1500 1/4 w 10%	Box 532	A.B.	CB 1521
45040	Resistor	1k 1/4 w 10%	Box 531	A.B.	CB 1021
45040	Resistor	100 1/4 w 10%	Box 525	A.B.	CB 1011

6.2 ORDERING INFORMATION

The prices listed in the parts list are subject to change without notice. Order parts by the Preston Box Number and the niminum order is $25.00.

SECTION 7
X-MOD ACCESSORIES

X-MOD RACK



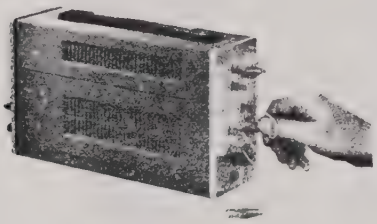
19-inch RETMA, 7 inches high
- 5 single module capacity $45.00

Fan module
- 19-inch RETMA, 3.5 inches high $96.00

Blank panels
- single module . . . . . $ 3.00

Blank X-MOD modules
- single module $25.00
- double module $28.00
- triple module $30.00

PATCHBOARD ACCESSORIES



Patchboard, 100 connector
(less receptacles)
- part number 30803 . . . . . .$5.00

Receptacles (pkg of 10)
- part number 43315 . . . . . .$1.00/pkg

Mating connector plate
- part number 30802 . . . . . .$2.00

Patch pins (10 unassembled)
- part number 30816-1 . . . . . .$2.00/pkg

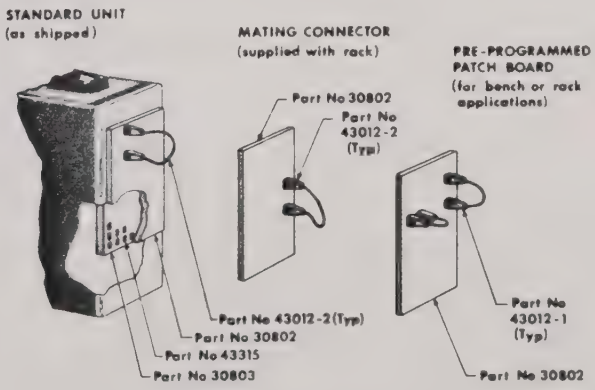
Patch cords (10 assembled)
- 2.5 inch, part no. 43012-6 . . . $6.00
- 5 inch, part no. 43012-2 . . . . $6.25
- 10 inch, part no. 43012-3 . . . $6.50
- 20 inch, part no. 43012-4 . . . $7.00

EXTENDER BOARDS

Single module size
- part number 30039 . . . . . $7.50

Double module size
- part number 43300 . . . . . .$12.50

Triple module size
- part number 43310 . . . . . .$15.00



SECTION 8
DRAWINGS

DRAWING NO.	DESCRIPTION
FIG. 8.1	BLOCK DIAGRAM
FIG. 8.2	DISTORTION
FIG. 8.3	HUM-NOISE
FIG. 8.4	AMPLITUDE STABILITY
FIG. 8.5	FLATNESS
FIG. 8.6	ATTENUATOR AND MONITOR ACCURACY
45000	TOP ASSEMBLY
45001	WIRING DIAGRAM
45002	SCHEMATIC
45006	FRONT PANEL ASSEMBLY
45007	REAR SUB-PANEL ASSEMBLY
45010	REGULATOR ASSEMBLY
45011	REGULATOR SCHEMATIC
45015	INTERCONNECT ASSEMBLY
45019	OSCILLATOR ASSEMBLY
45026	TRIMMER CAPACITOR ASSEMBLY
45032	BUFFER ASSEMBLY
45037	RANGE SWITCH ASSEMBLY
45040	MONITOR ASSEMBLY
45041	MONITOR SCHEMATIC
40191	ATTENUATOR ASSEMBLY
40212	PLATE 2 ASSEMBLY

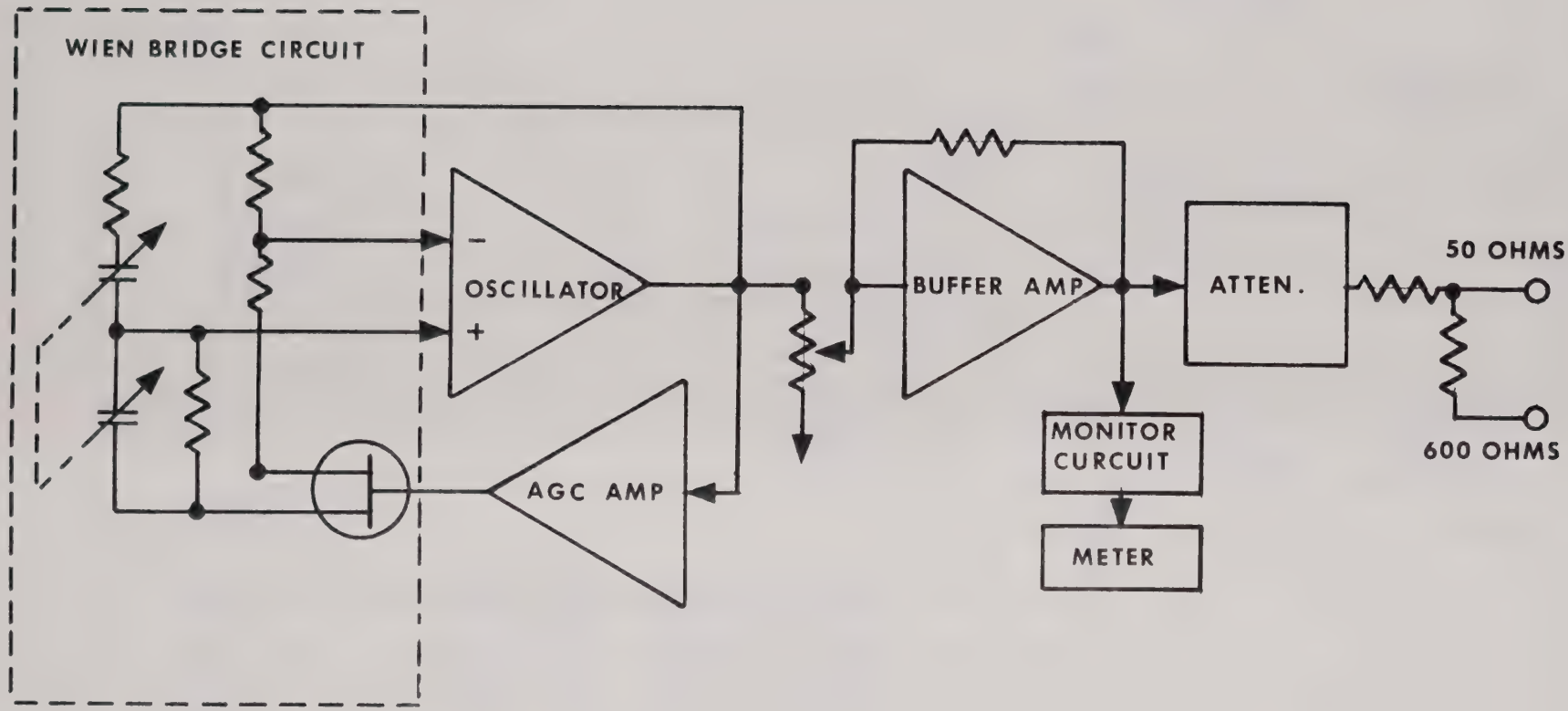


Figure 8-1
BLOCK DIAGRAM
X-MOD 134A

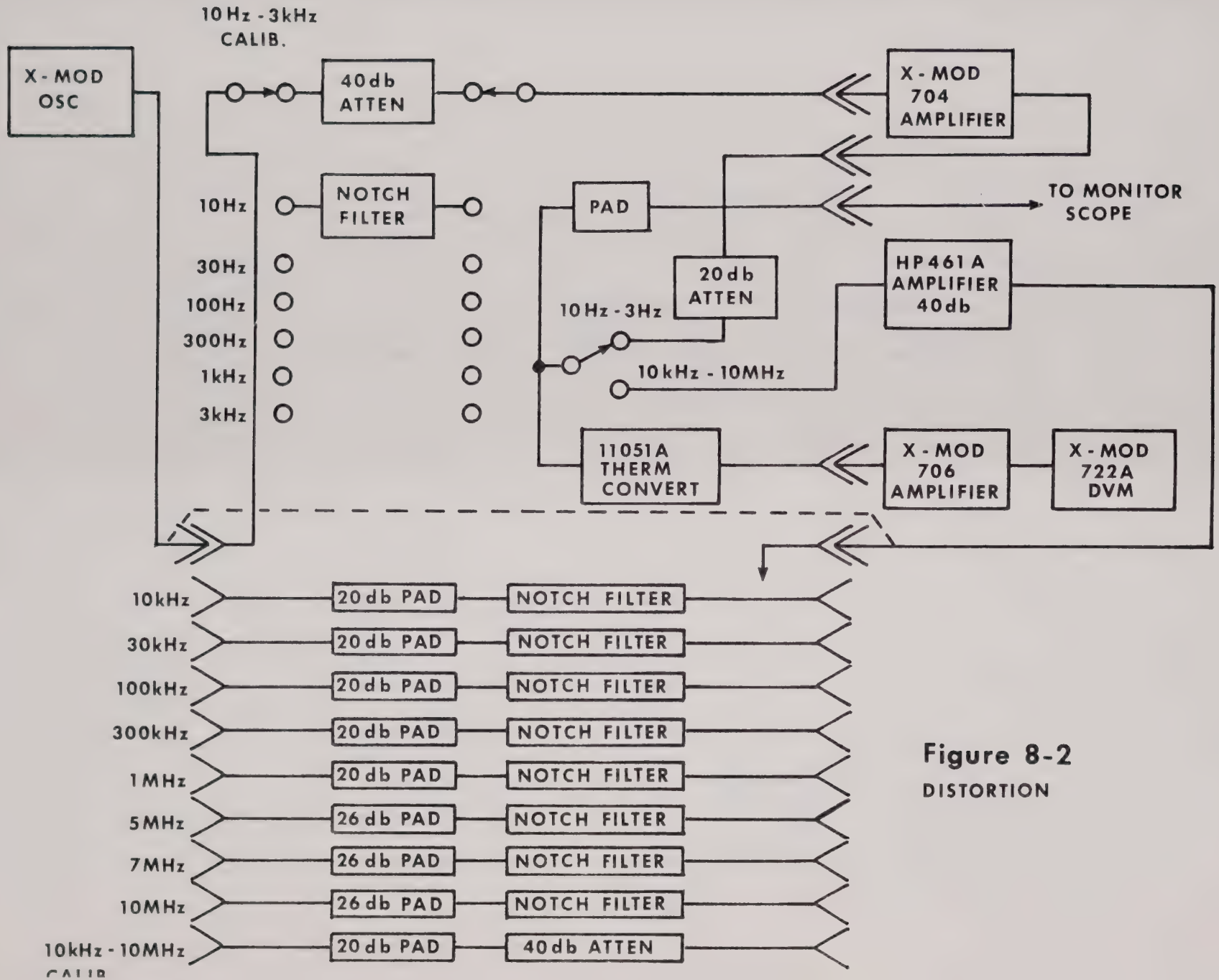


Figure 8-2
DISTORTION

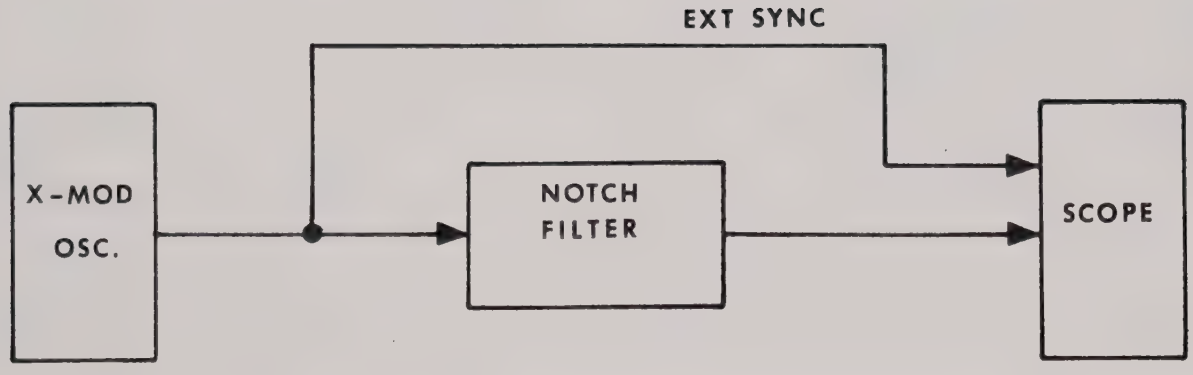


Figure 8-3
HUM - NOISE

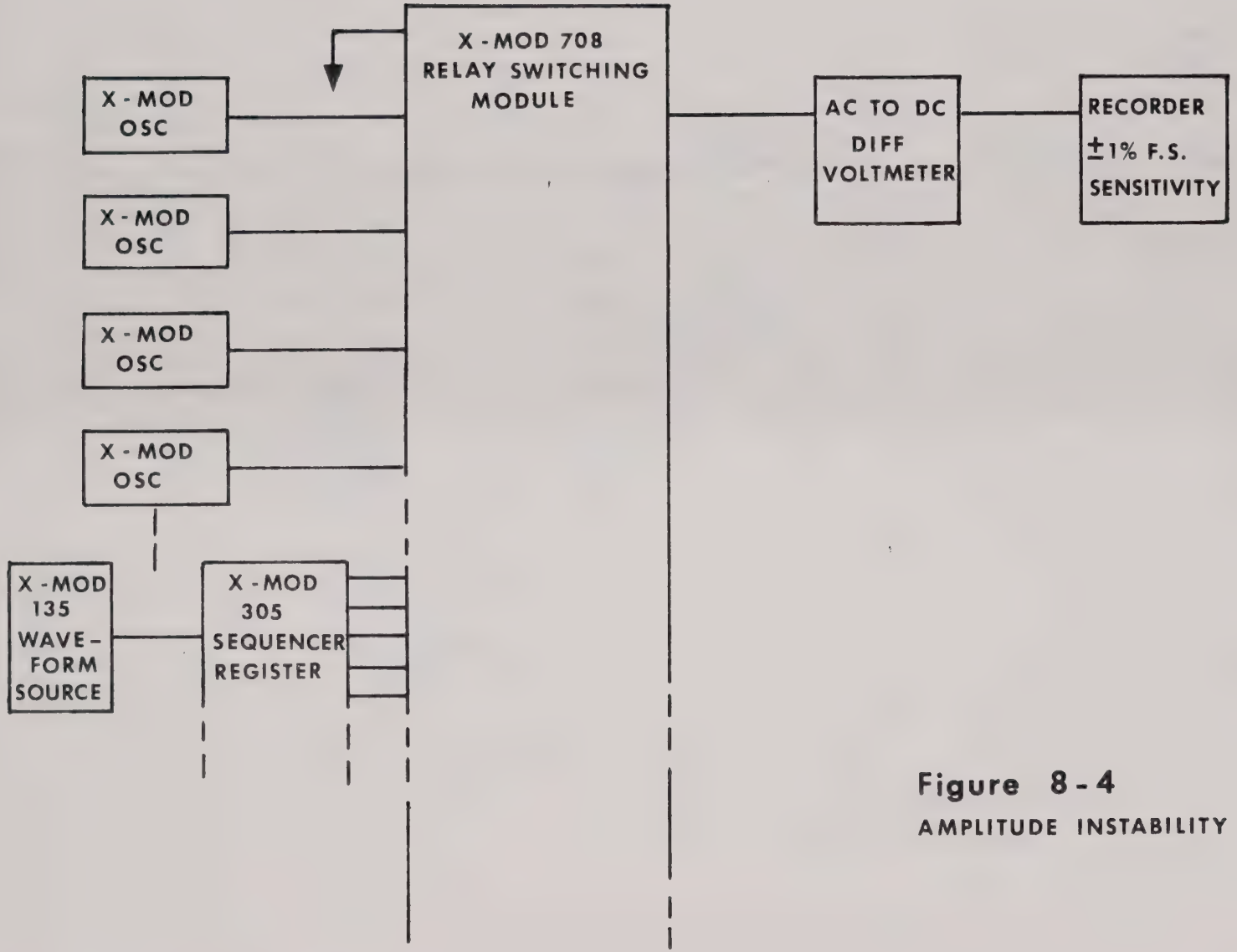


Figure 8-4

AMPLITUDE INSTABILITY

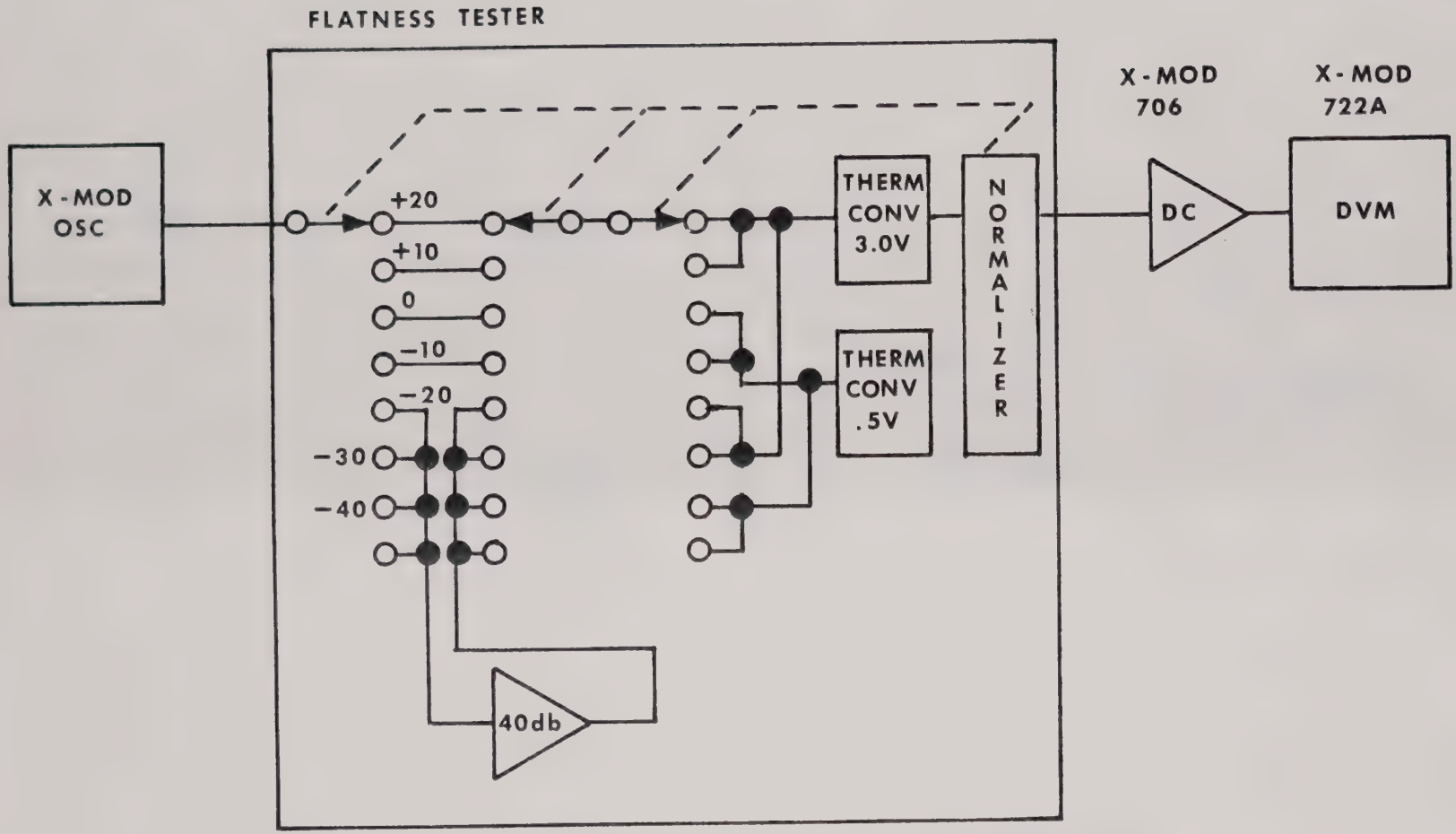


Figure 8-5
FLATNESS

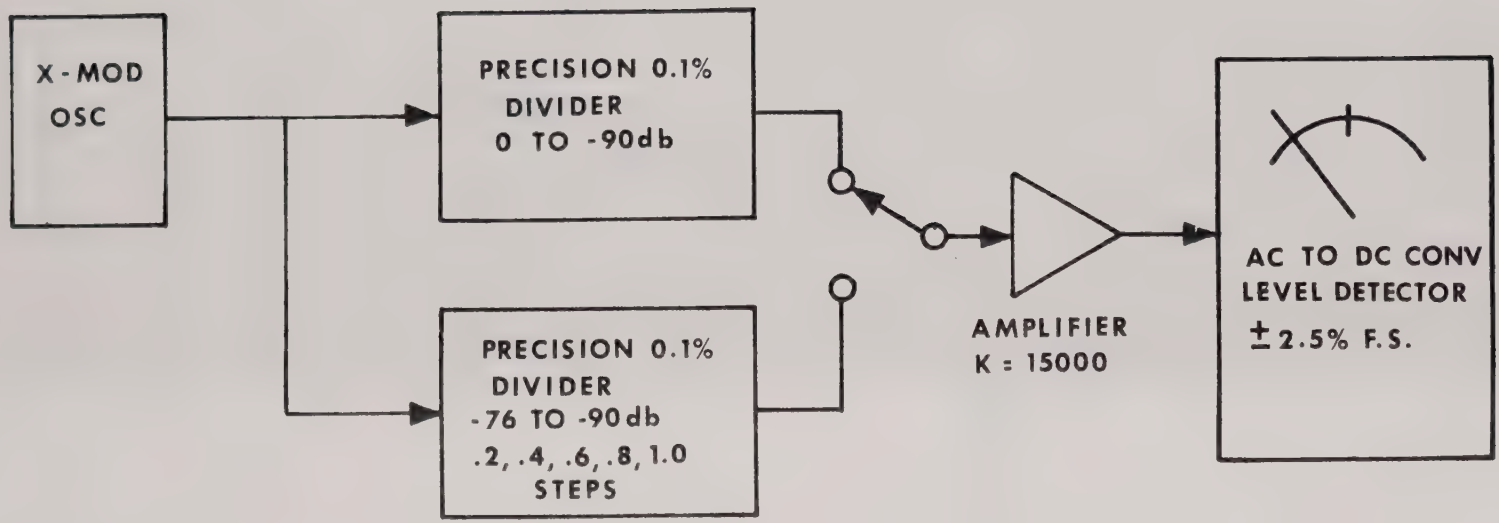
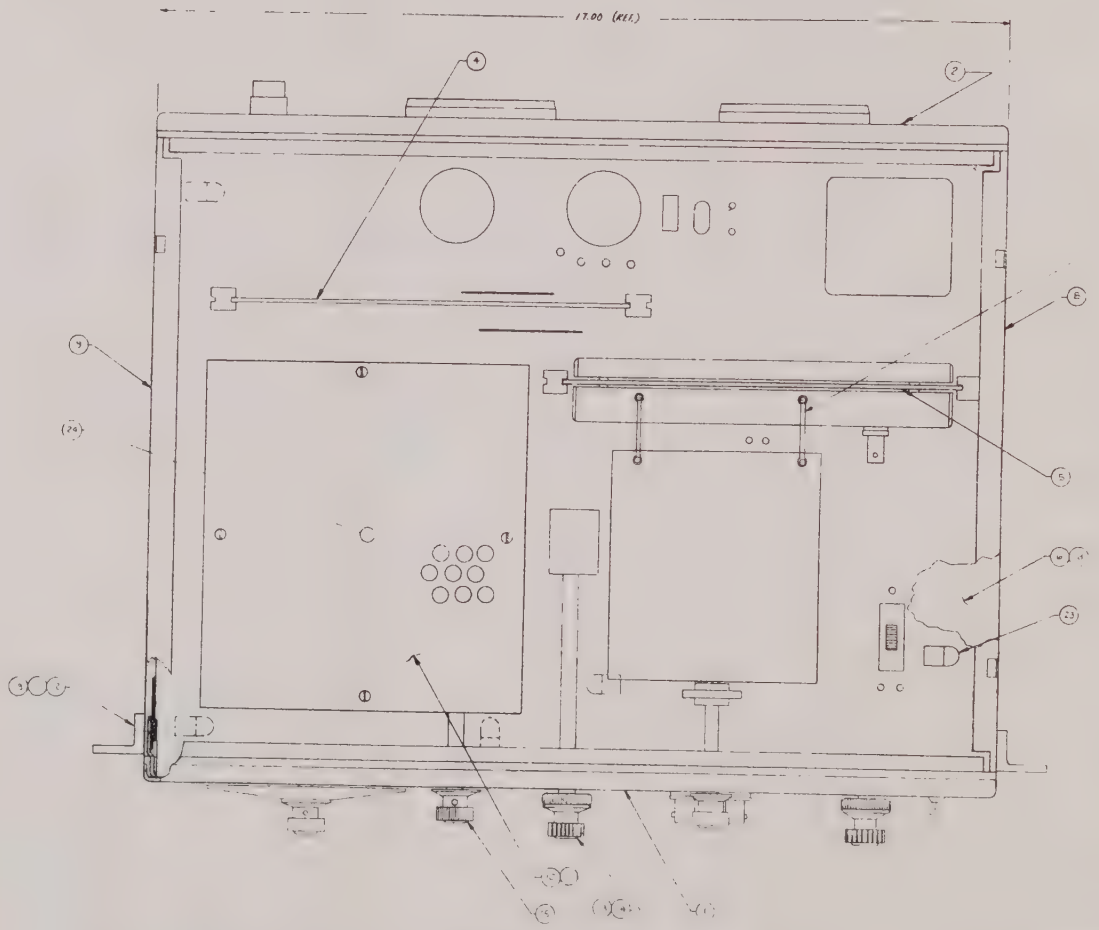
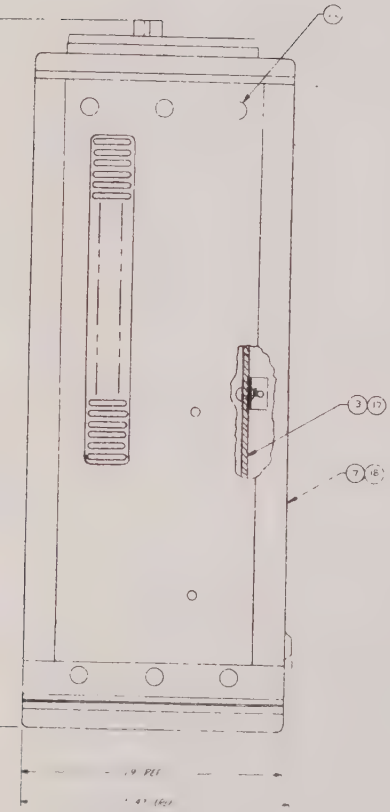


Figure 8-6

ATTENUATOR AND MONITOR ACCURACY


17.00 (REF.)

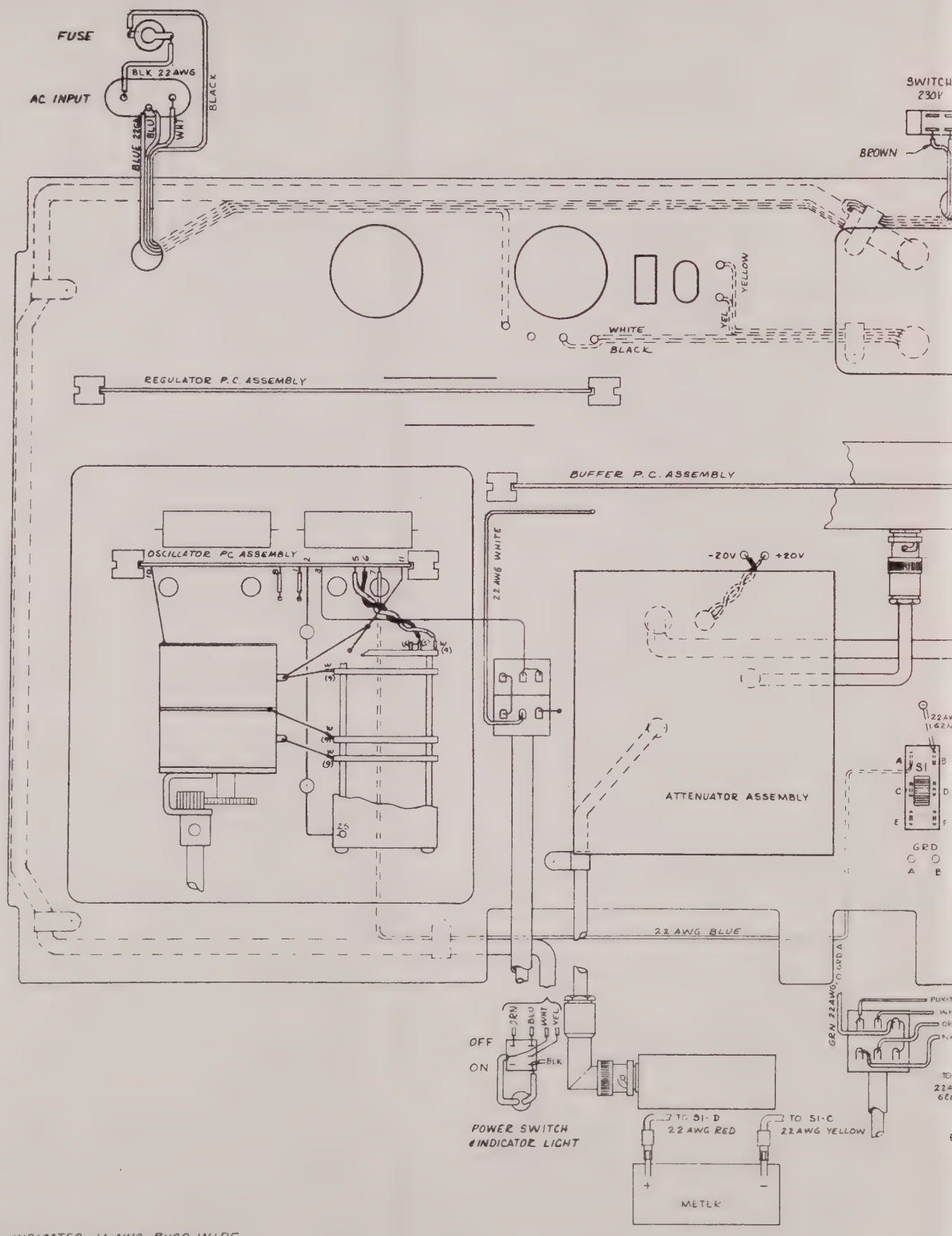
REVISIONS			
UNIT	DESCRIPTION	DATE	APPROVED



TABULATION

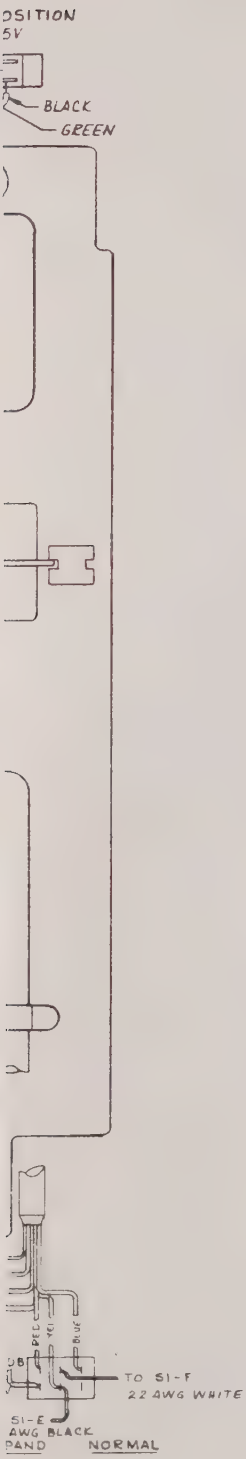
DWG. NO.	ITEM 1	ITEM 2	ITEM 3	ITEM 4	ITEM 5	ITEM 6	ITEM 7	ITEM 8	ITEM 9	ITEM 10	ITEM 11	ITEM 13	ITEM 14	ITEM 15
45000	45004	45[illegible]	45015	45010	45012	4(1410-2	45045	4041M-1	4041R-2	45025	40312	30071-1	30051-7	8373-3
45000-1	45001-1	45018	45019-1	45[illegible]	45032-1	4 4[illegible]	45045-1	4 4[illegible] 3	4041M-4	4[illegible]	4[illegible]	[illegible] 8	[illegible]	[illegible]

DWG. NO.	ITEM	QTY.	PART NO.	DESCRIPTION
	30			
	25			
	28			
	21	1	45009	SHIPPING PIN
	26	2	45035	GROUND STRAP
	25			
283	24	1		PLUG
27	23	1		CLAMP, CABLE
	22	1	95049	SCREW FH 8-32 X 3/8
	[illegible]	[illegible]		SCREW BH 8-32 X 1/4
	[illegible]	[illegible]		[illegible]
	[illegible]	[illegible]		[illegible]
	[illegible]	[illegible]		[illegible]



1. — INDICATES 16 AWG BUSS WIRE
— INDICATES INSULATED WIRE

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



ITEM	QTY	PART NO.	DESCRIPTION	VALUE	REFERENCE DESIGNATION

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED

MECHANICAL DWG TOLERANCES

ELECTRICAL DWG DIMENSIONING

	BY	DATE
DRAWN		
CHK		
ENGR		
APPD		
APPD		

WYLE

WIRING DIAGRAM
X-MOD 134A OSCILLATOR

PRESTON SCIENTIFIC INCORPORATED
Anaheim, Calif.

MATERIAL

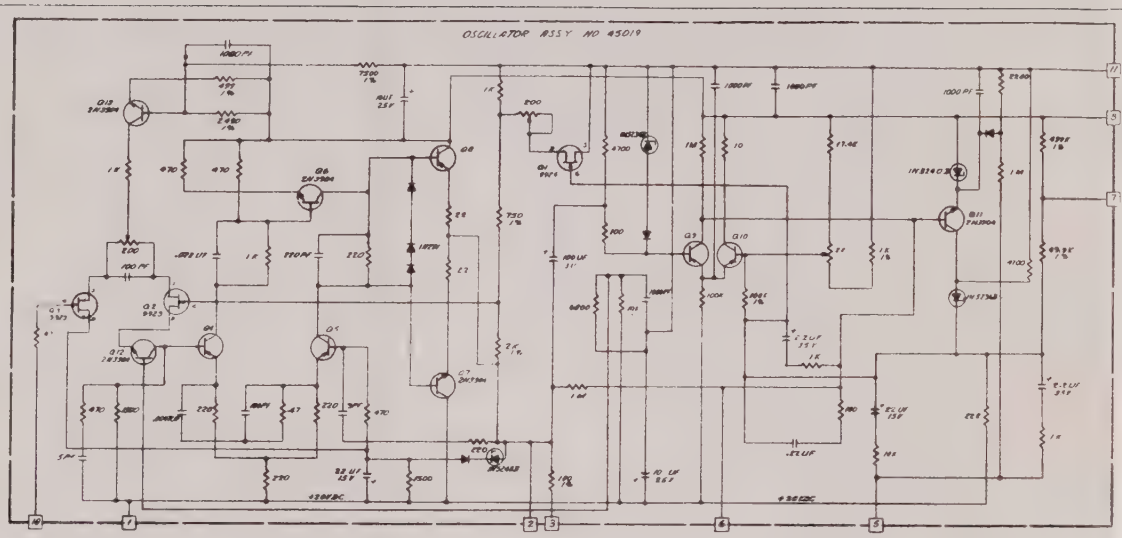
FINISH

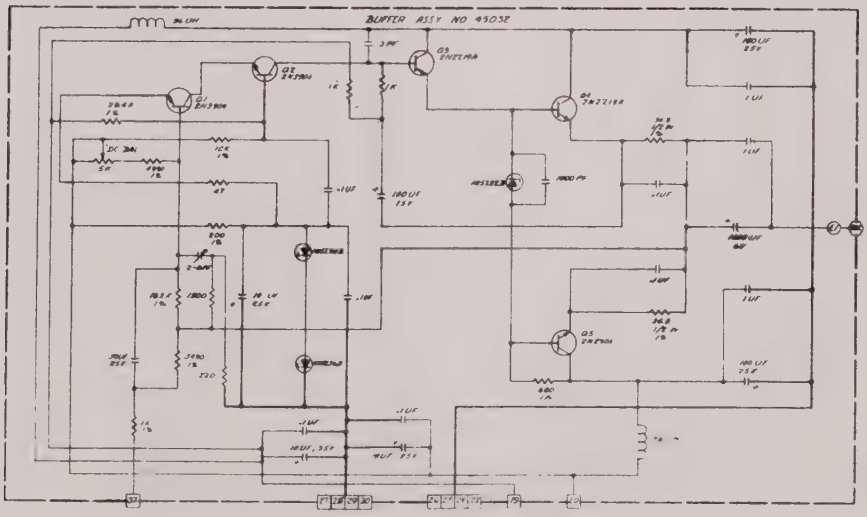
SCALE

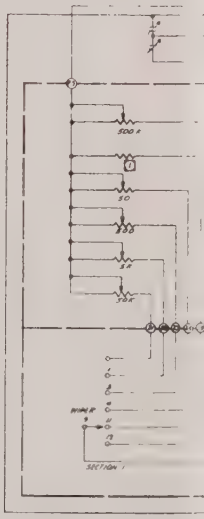
D

45001

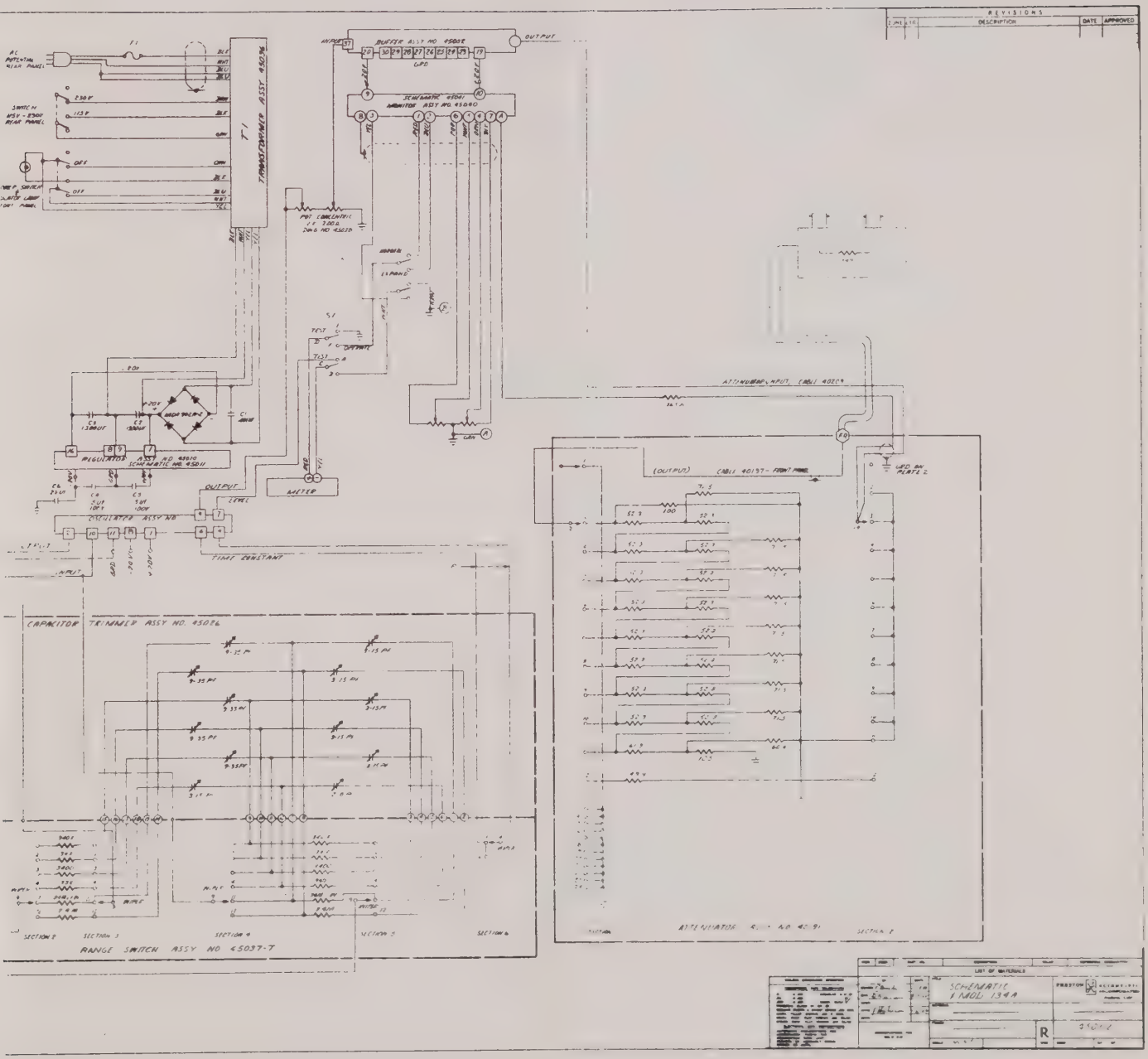
SHEET 1 OF 1

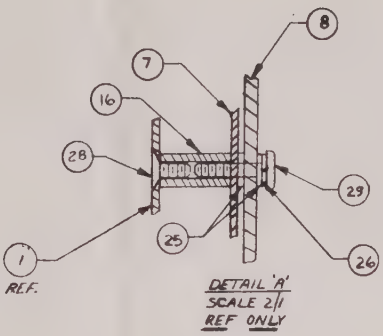




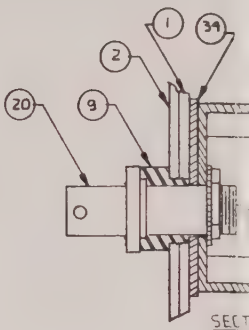


4 RESISTOR REF 1/4W 10%.
3 ☐ DENOTES PIN NUMBERS.
2 ○ DENOTES TERMINAL NUMBERS ON BOARD.
(1) RESISTOR TO BE SELECTED IN TEST, 1/4W, 10%.
UNLESS OTHERWISE SPECIFIED

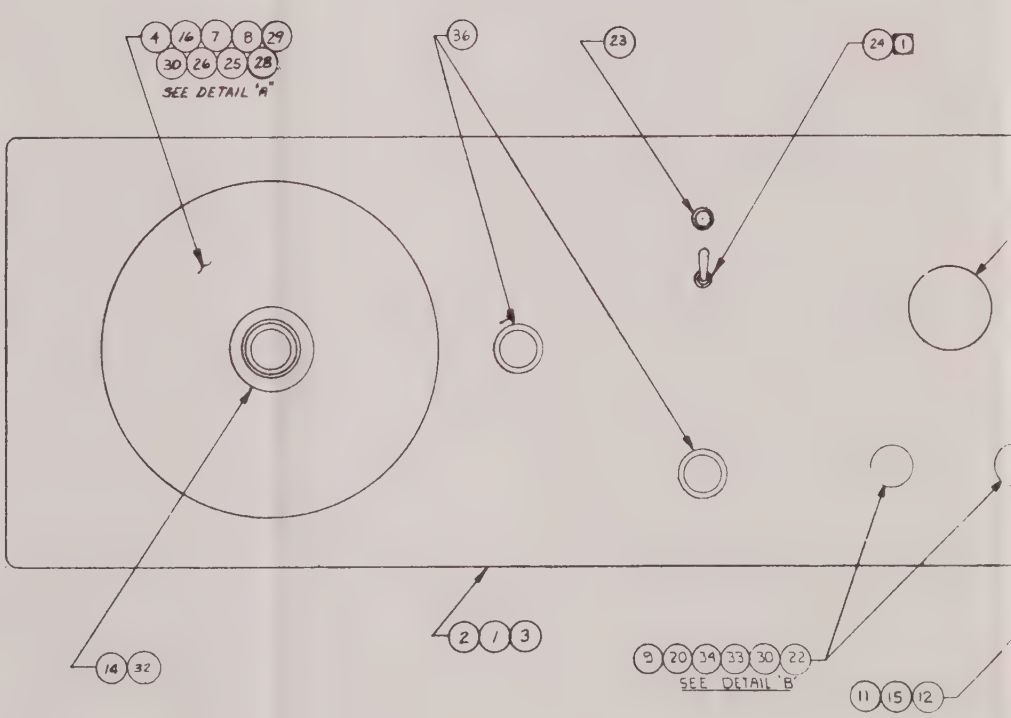

REVISIONS
DESCRIPTION
DATE
APPROVED
TRANSFORMER ASSY 45016
BUFFER ASSY NO 45008
SCHEMATIC 45041
MONITOR ASSY NO 45040
POT CONCENTRIC
RECTIFIER ASSY NO 45010
SCHEMATIC NO 45011
METER
OSCILLATOR ASSY NO
FINE CONSTANT
CAPACITOR TRIMMER ASSY NO 45026
RANGE SWITCH ASSY NO 45037-7
ATTENUATOR INPUT, CABLE 40209
(OUTPUT) (CABLE 40197 - FRONT PANEL)
GRID BAR PLATE 2
ATTENUATOR ASSY NO 45091
SCHEMATIC
MODEL 1394A
PRESTON
R



DETAIL 'A'
SCALE 2/1
REF ONLY



SECT
SCA
REF



DWG NO	ITEM 1	ITEM
45006	45005	450
45006-1	45005-1	4500

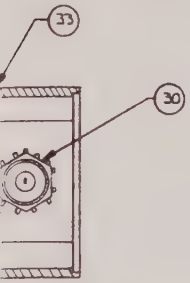
(3) SOW FRONT DRESS & SUB PANEL, AT THE 4 CORN

(2) SPRAY INSIDE OF ITEM 10 LIGHTLY WITH ITEM 3
LIGHTLY WITH LINT FREE CLOTH TO SPREAD CO

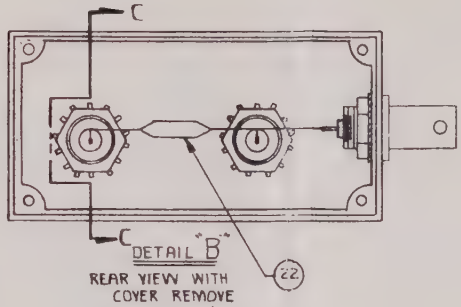
(1) ITEM 24 INCLUDES A PANEL DRESS NUT.

NOTE: UNLESS OTHERWISE SPECIFIED

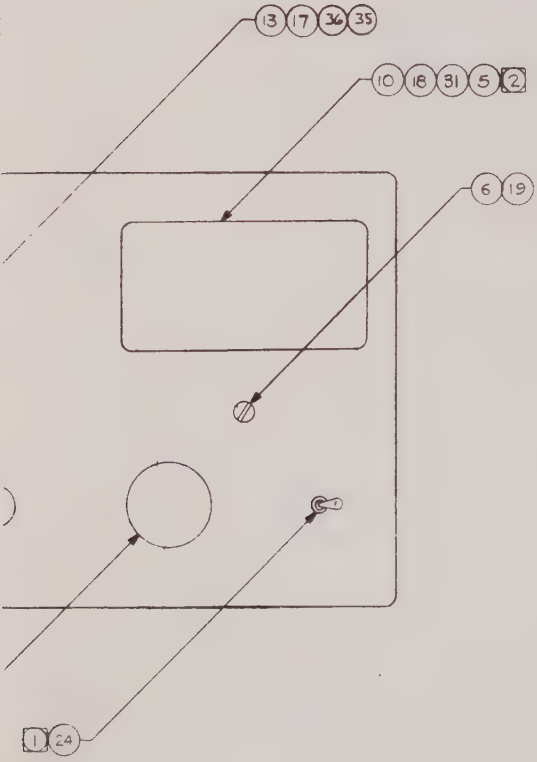
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	PPE RELEASE REV	10-4-68	
B	PRE RELEASE REVISION	10/8/68	GJ
C	PRE RELEASE REVISION	10-24-68	RDH
D	E.O. 3047 ADDED TAB.	12-13-68	RB



ON C-C
2/1
ONLY



DETAIL "B"
REAR VIEW WITH COVER REMOVE
SCALE 2/1
REF. ONLY



	ITEM	REQD	PART NO.	DESCRIPTION	VALUE	REFERENCE DESIGNATION
	37					
2X	36	3		BUSHING, SNAP		
229	35	1		COUPLING		
	34	1	40207	INSULATOR, BOX		
	33	1	40208	BOX & LID, MODIFIED		
2293	32	1		SHAFT EXTENDER		
904A	31	AR		COMPOUND ANTI ELECTRSTATIC		
158L	30	1		CONNECTOR BNC		
66E	29	3		SCREW 4-40X 3/8 F.H.		
628	28	3		SCREW, 4-40X 3/16 F.H.		
933B	27	AR		ADHESIVE, RESINBOND		
874	26	3		WASHER, #4 LOCK		
86F	25	6		WASHER, FLAT #4		
1 765	24	2		SWITCH, TOGGLE		
28SA	23	1		LAMP		
404	22	1		RESISTOR 1/4W 1%	549	
798C	21	2		LUG, SOLDER		
158E	20	2		CONNECTOR, BNC		
43C	19	1		RING, RETAINING		
43D	18	4		RING, RETAINING		
	17	1	40193	SHAFT		
	16	3	9867-10	SPACER, .325 LONG		
	15	1	30818	POTENTIOMETER	2K-200Ω	
	14	1	SEE TAB	KNOB		
	13	1	SEE TAB	KNOB CONTROL		
	12	1	SEE TAB	KNOB, CONTROL		
	11	1	SEE TAB	BASE, CONCENTRIC CONTROL		
2	10	1	30571	BEZEL		
	9	2	93061	INSULATOR BNC		
	8	1	SEE TAB	STOP, OUTER RING		
	7	1	SEE TAB	DRIVE, PLANETARY W/STOP		
	6	1	30573	BUTTON, ZERO ADJUST		
	5	1	30546-19	METER MOVEMENT ASSY		
	4	1	45054	DIAL		
	3	1	40321	DRESS BAND		
	2	1	SEE TAB	DRESS PANEL FRONT		
	1	1	SEE TAB	SUB-PANEL, FRONT		

BOX NO

LIST OF MATERIALS

45006-T

TABULATION

	ITEM 7	ITEM 8	ITEM 11	ITEM 12	ITEM 13	ITEM 14
	30093	30086	30071-3	30051-7	8373-3	30522
1	30093-1	30086-1	30071-7	30051-10	8373-5	30522-1

PS WITH ADHESIVE, ITEM 27.
WIPE VERY
T EVENLY.

UNLESS OTHERWISE SPECIFIED
MECHANICAL DWG TOLERANCES
X ± .030 ANGULAR ± 0° 30'
XX ± .010 30"
XXX ± .005 MACH. SURF. √
THREADS: CLASS 3A OR 3B
REMOVE BURRS & SHARP EDGES .020 MAX.
MACH. FILLET RADIUS .020 R MAX.
MACH. SURF. FLAT WITHIN .005 IN/IN
OTHER SURF. FLAT WITHIN .010 IN/IN
ELECTRICAL DWG DESIGNATIONS
REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THIS DESIGNATION WITH UNIT NUMBER OR ASSEMBLY DESIGNATION OR BOTH.

	BY	DATE
DRAWN	CLEMENTS	9/1/68
CHK		9/14/68
ENGR		
APPD		12-9-68
APPD		

ABBREVIATIONS PER MIL-STD-12

TITLE: FRONT PANEL ASSY, OSCILLATOR

PRESTON SCIENTIFIC INCORPORATED Anaheim, Calif.

MATERIAL

FINISH

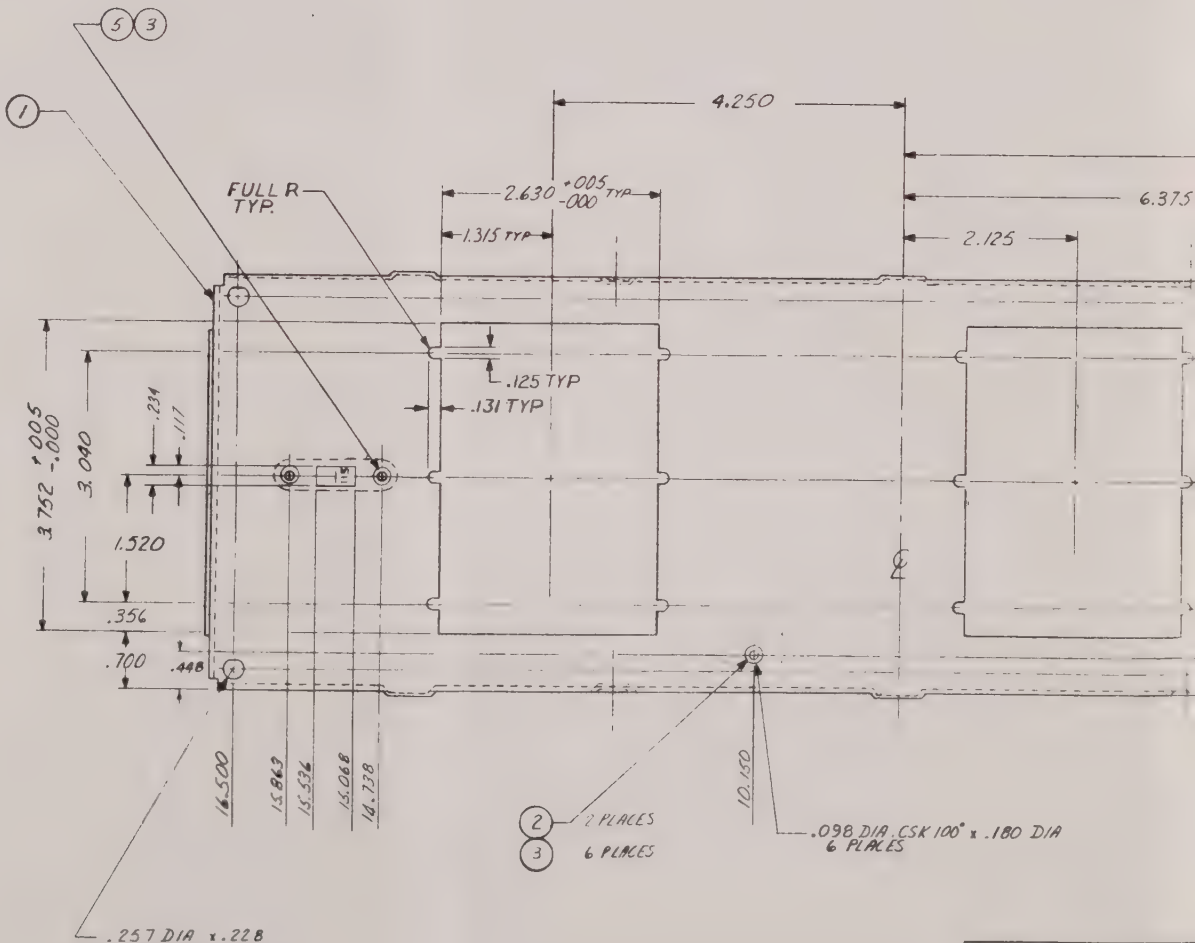
SCALE 1/1

SIZE D

CODE

45006-T

SH 1 OF 1

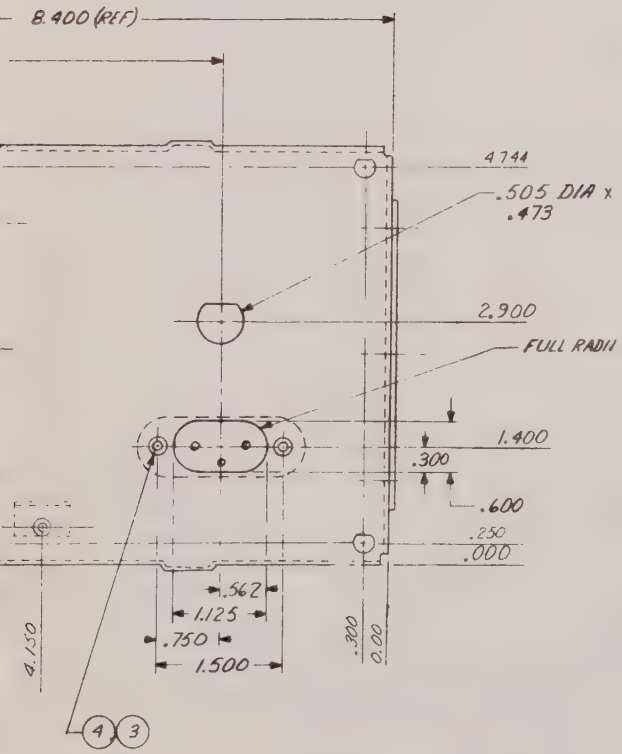


TABULATION	
45007	ETCH PER PRINT
45007-1	CHEM-FILM PER

NOTES:

1. SEE TABULATION.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	PRL RELEASE REV.	10-3-68	
B	EO 3018	11-1-68	
C	EO 3069	1-8-69	



ITEM	QTY	PART NO.	DESCRIPTION	VALUE	REFERENCE DESIGNATION
7658	5	1	SWITCH		
2088	4	1	SOCKET		
886	3	6	RIVET, FL.HD. 3/32 x 3/16		
301	2	2	NUT, TINNERMAN		
	1	40311	PANEL, SUB. BLANK		

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
MECHANICAL DWG TOLERANCES
ELECTRICAL DWG DESIGNATIONS

	BY	DATE
DRAWN	F Brush	9-7-68
ENGR		9-10-68
APPD		10-9-68
APPD		

TITLE: SUB-PANEL, REAR
X MOD 134A

PRESTON SCIENTIFIC INCORPORATED, Anaheim, Calif.

MATERIAL

FINISH

SIZE D

45007-T

SCALE 1:1

SHEET 1 OF 1

N SPEC # 28963
P MIL-C-5541

45007-T

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL

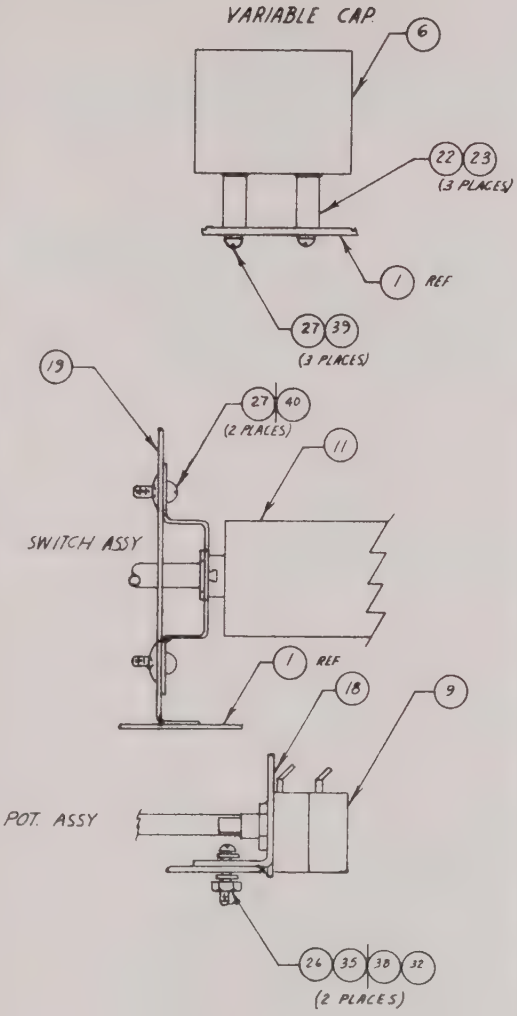
3 Q7 & Q8 MOUNTS FLUSH WITH P.C. BOARD.
2. FOR SCHEMATIC DIAGRAM SEE DWG. NO. 45011.
[7] DIMENSION BETWEEN TARGET CENTERS.

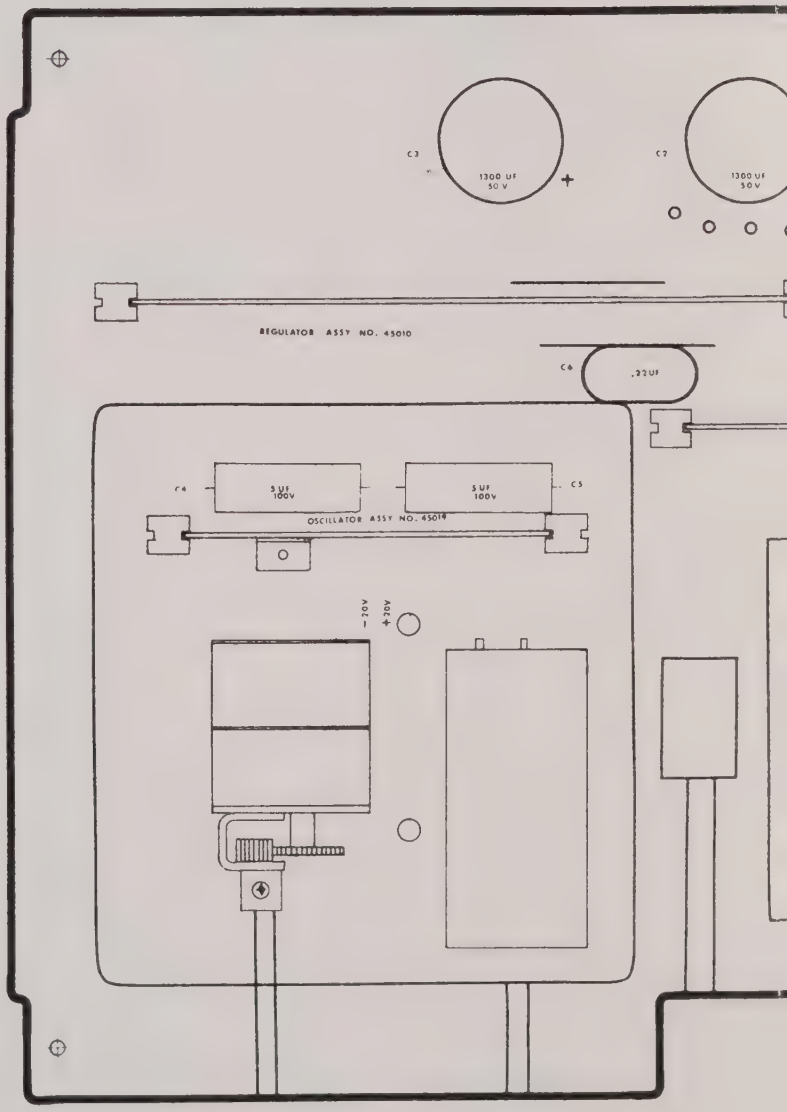
TAB	
DWG	ITEM 2
45010	30064
45010-1	30064-1

LIST OF MATERIALS

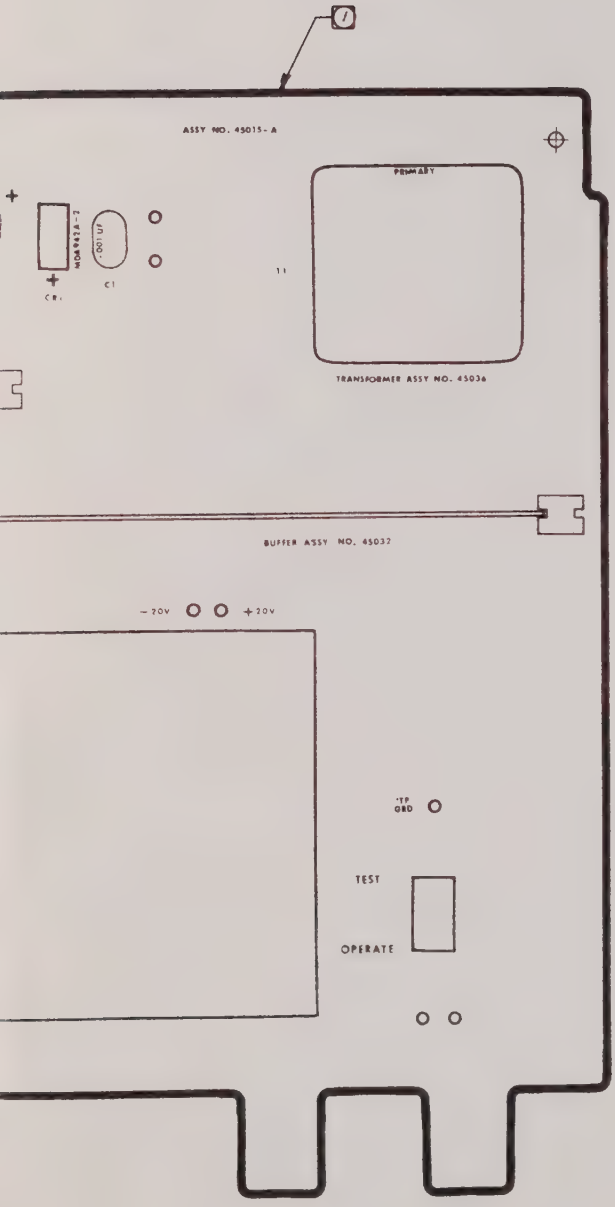
BOX NO.	QTY REQD	PART NO	DESCRIPTION	VALUE	REFERENCE DESIGNATION
	2	2	SEE TAB		
	1	1	45013	HEAT SINK ASSY	
			DRILLED & RIVETED ASSY.		
3438	3	2	POTENTIOMETER	5K	R2,6
477	12	1	RESISTOR, 1/4 W, 1%	9.9K	R5
473	11	1		19.9K	R3
472	10	1		47.5K	R7
465	9	1		20K	R1
467	8	2		100K	R9,12
541	7	3		22K	R4,8
421	6	4		3.2K	R14,15
431	5	6		1K	R13,11
529	4	1	RESISTOR, 1/4W, 10%	10 Ω	R10
	3				
	2	2	HEAT SINK ASSY		Q4,5 (REF)
	1	1	DRILLED & RIVETED ASSY.		
BOX NO.	QTY REQD	PART NO	DESCRIPTION	VALUE	REFERENCE DESIGNATION

| | | | |


VARIABLE CAP.
6
22
23
(3 PLACES)
1
REF
27
39
(3 PLACES)
19
27
40
(2 PLACES)
11
SWITCH ASSY
1
REF
18
9
POT. ASSY
24
35
38
32
(2 PLACES)


C3
1300 UF
50 V
C2
1300 UF
50 V
REGULATOR ASSY NO. 45010
C6
.22UF
C4
5 UF
100V
5 UF
100V
C5
OSCILLATOR ASSY NO. 45018
-10V
+20V

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	PRE RELEASE CNG.	12-19-68	



TABULATION				
DASH NO.	ITEM 11	ITEM 18	ITEM 19	ITEM 20
45015	45037	45031	45024	45023
45015-1	45037-1	45031-1	45024-1	45023-1

	ITEM	QTY	PART NO.	DESCRIPTION	VALUE	REFERENCE DESIGNATION
300	40	2		TINNERMAN NUT RD		
	39	7		WASHER. LOCK #6		
	38	4		WASHER. LOCK #4		
869	37	4		WASHER FLAT #6		
869	35	2		WASHER. FLAT #4		
	34					
	33					
311	32	4		NUT. HEX #4-40		
	31					
	30	2	28921	SCREW		
712	29	7		SCREW, 4Z x 3/8		
710A	28	6		SCREW. HEX WASHER 1/2 LG		
674	27	10		SCREW. #6-32 x 7/16 PHMS		
668	26	4		SCREW 4-40 x 1/2 PHMS		
	25					
	24					
	23	3	9854	STUD		
	22	3	13714-1	STANDOFF		
278	21	1		GROMMET		
	20	1	SEE TAB	OSCILLATOR BOX. REAR		
	19	1	SEE TAB	OSCILLATOR BOX. FRONT		
	18	1	SEE TAB	BRACKET. POT. MTG		
	17	2	40192	WIRE SUPPORT		
	16	6	40309	GUIDE POST		
765C	15			SWITCH		
	14	1	40191	ATTENUATOR ASSY		
	13	1	45036	TRANSFORMER ASSY		T1
	12	1	45019	OSCILLATOR BD ASSY		
	11	1	SEE TAB	RANGE SWITCH ASSY		
	10					
	9	1	45038	POTENTIOMETER		
245A	8	1		RECTIFIER. BRIDGE	MDA942A-2	CR1
119	7			CAPACITOR	.22 UF	C6
	6	1	30810	CAPACITOR, VAR. AIR		
	5	2	25054	CAPACITOR, 100V	5 UF	C4.C5
155A	4	2		CAPACITOR, 50V	1900 UF	C2.C3
76	3	1		CAPACITOR	.001 UF	C1
394A	2	AIR		WIRE #22 GA		
		1	45017	DRILL & RIVET ASSY		

LIST OF MATERIALS

1 MARK DASH NO. USING WHITE INK.

UNLESS OTHERWISE SPECIFIED
MECHANICAL DIMS TOLERANCES
.X ± .100 ANGULAR ± 0° 30'
.XX ± .030 ± 1°
.XXX ± .005 BEND, SHEAR ± 1/2°
THREADS CLASS 2A OR 2B
REMOVE BURRS & SHARP EDGES .005 MAX.
BREAK FILLET RADIUS .010 R MAX.
BREAK SHARP FLAT WITHIN .005 BK/BK
OTHER SHARP FLAT WITHIN .010 BK/BK
ELECTRICAL DIMS DESIGNATIONS
REFERENCE DESIGNATIONS ARE ABBREVIATED FROM THE DESIGNATION WITH UNIT NUMBER OF ASSEMBLY ITEMS SHOWN ON DETAIL

	BY	DATE
DRAWN	P.B.	12-19-68
CHK		
ENGR		
APPD		
APPD		

ABBREVIATIONS PER MIL-STD-12

TITLE: PRINTED CIRCUIT ASSY INTERCONNECT BD 134A

MATERIAL

FINISH

SCALE 1:1

R

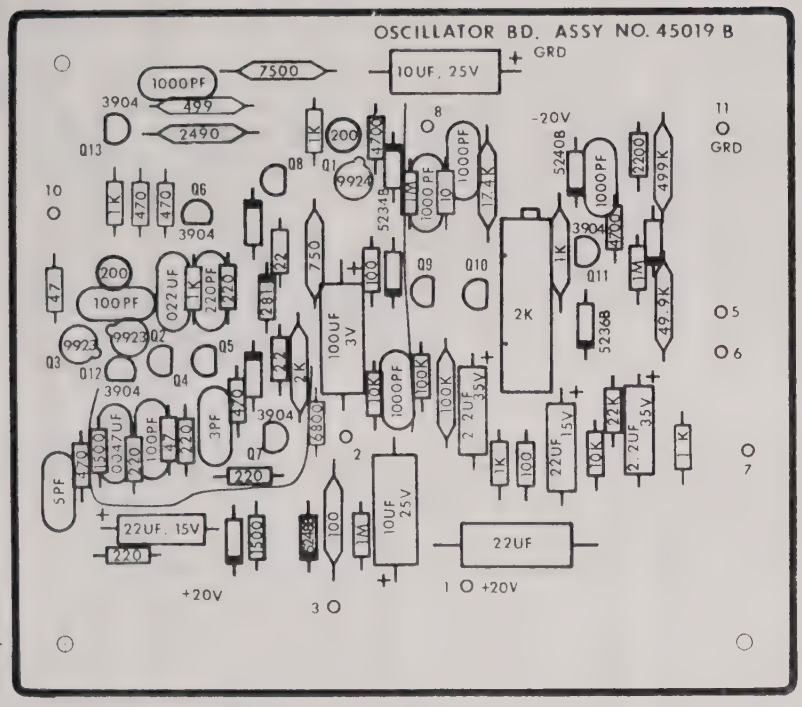
SIZE

PRESTON SCIENTIFIC INCORPORATED Anaheim, Calif

45015

CODE

SH 1 OF 1



NOTE: UNLESS OTHERWISE SPECIFIED.

1. FOR SCHEMATIC DIAGRAM SEE DWG NO. 45002.
2. ALL DIODES ARE IN914
3. ALL TRANSISTOR ARE 2N3906

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
B	PRE RELEASE RE	11-7-68	RG

BOX NO.	ITEM	REQD	PART NO	DESCRIPTION	VALUE	REFERENCE DESIGNATION
248J	50	1		DIODE	IN5240B	
846A	49	5		TRANSISTOR	2N3906	Q4,5,8,9,10
846	48	5			2N3909	Q6,7,11,12,13
	47	1	9924		UC200	Q1
	46	2	9923	TRANSISTOR	UC200	Q2,3
248H	45	1		DIODE	IN5234B	
239	44	5		DIODE	IN914	
231	43	1		DIODE	IN281	
248G	42	1		DIODE	IN5231B	
347	41	1		POTENTIOMETER	2K	
343B	40	2		POTENTIOMETER	200	
87	39	1		CAPACITOR	.0047UF	
196A	38	1		CAPACITOR	100UF, 3V	
199	37	2			22UF, 15V	
192	36	2			10UF, 25V	
133	35	2			2.2UF, 35V	
	34	1	45234		22UF	
98	33	1			.022UF	
76	32	5			1000PF	
67	31	1			220PF	
62	30	2			100PF	
50	29	1		CAPACITOR	5PF	
48	28	1		CAPACITOR	3PF	
484	27	1		RESISTOR 1/4W 1%	499K	
478	26	1			100K	
473	25	1			49.9K	
462	24	1			17.4K	
451F	23	1			7500	
427	22	1			2490	
422	21	1			2K	
409	20	1			1K	
407	19	1			750	
402	18	1			499	
397	17	1		1%	100	
551	16	3		10%	1M	
547	15	1			100K	
541	14	1			22K	
538	13	2			10K	
537	12	1			6800	
536	11	2			4700	
532	10	2			1500	
531	9	5			1K	
523	8	4			470	
527	7	5			220	
525	6	2			100	
523	5	2			47	
521	4	2			22	
520	3	1		RESISTOR 1/4W, 10%	10	
533	2	1		RESISTOR 1/4W, 10%	2200	
	1	1	45021	DRILL & RIVET ASSY		

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
MECHANICAL DWG TOLERANCES
X = .050 ANGULAR = 0° 30'
.XX = .020 63
.XXX = .005 MAX. SURF
THREADS CLASS 2A OR 2B
REMOVE BURRS & SHARP EDGES .020 MAX
MACH. FILLET RAD IS .020 R MAX
MACH. SURF. FLAT WITHIN .001 IN/IN
OTHER SURF. FLAT WITHIN .005 IN/IN
ELECTRICAL DWG. DESIGNATIONS
REFERENCE DESIGNATIONS ARE ABBREVIATED PER THE DESIGNATION WITH UNIT NUMBER & ASSEMBLY DESIG

	BY	DATE
DRAWN		11-7-68
CHK		
ENGR		
APPD		
APPD		

ABBREVIATIONS PER MIL STD 12B

TITLE: PRINTED CIRCUIT ASSY
OSCILLATOR 134A

MATERIAL

FINISH

PRESTON SCIENTIFIC INCORPORATED

C

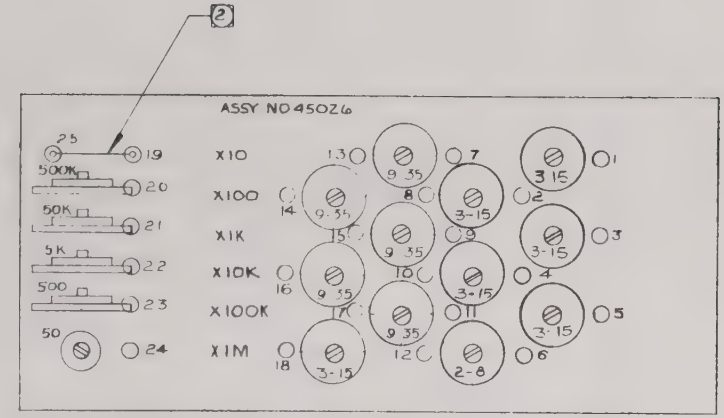
45019

SCALE 2/1

SHT 1 OF 2

ITEM	REQD	PART NO.	DESCRIPTION	VALUE	REFERENCE DESGINATION

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	PRE RELEASE REV	10/24/68	



BOX NO	ITEM	RFQD	PART NO.	DESCRIPTION	VALUE	REFERENCE DESIGNATION
994K	13	A/R		WIRE	24AWG	
[2]	12	1		RESISTOR 1/4W, 10%	[2]	
	11					
340U	10	1	62P	POTENTIOMETER	50Ω	
344E	9	1		↕	500Ω	
349C	8	1		↕	5K	
371	7	1		↕	50K	
373Z	6	1		POTENTIOMETER	500K	
	5					
79	4	1		CAPACITOR	2-8 PF	
78	3	6		CAPACITOR	3-15 PF	
77	2	5		CAPACITOR	9-35 PF	
	1	1	45028	DRILL & RIVET ASSY		

LIST OF MATERIALS

[2] RESISTOR 1/4W 10% TO BE SELECTED IN TEST; ASSEMBLE WITH STRAP.

1. ALL CAPACITOR ARE 9-35 PF.

NOTE: UNLESS OTHERWISE SPECIFIED

UNLESS OTHERWISE SPECIFIED
MECHANICAL DWG TOLERANCES
X ± .010 ANGULAR ± 0° 30'
.XX ± .005
.XXX ± .002 MACH SURF. √
THREADS: CLASS 2A OR 2B
REMOVE BURRS & SHARP EDGES .020 MAX.
MACH. FILLET RADIUS .020 R MAX.
MACH. SURF. FLAT WITHIN .001 IN/IN
OTHER SURF. FLAT WITHIN .005 IN/IN
ELECTRICAL DWG DESIGNATIONS
REFERENCE DESIGNATIONS ARE ABBREVIATED PREFIX THE DESIGNATION WITH UNIT NUMBER OR ASSEMBLY DESIGNATION OR BOTH

ABBREVIATIONS PER MIL STD-12

	BY	DATE
DRAWN	[illegible]	9-13-68
CHK	[illegible]	9-13-68
ENGR	[illegible]	9-13-68
APPD	[illegible]	
APPD		

TITLE: PRINTED CIRCUIT ASSY TRIMMER CAPACITOR BD

PRESTON SCIENTIFIC INCORPORATED Anaheim, Calif

MATERIAL

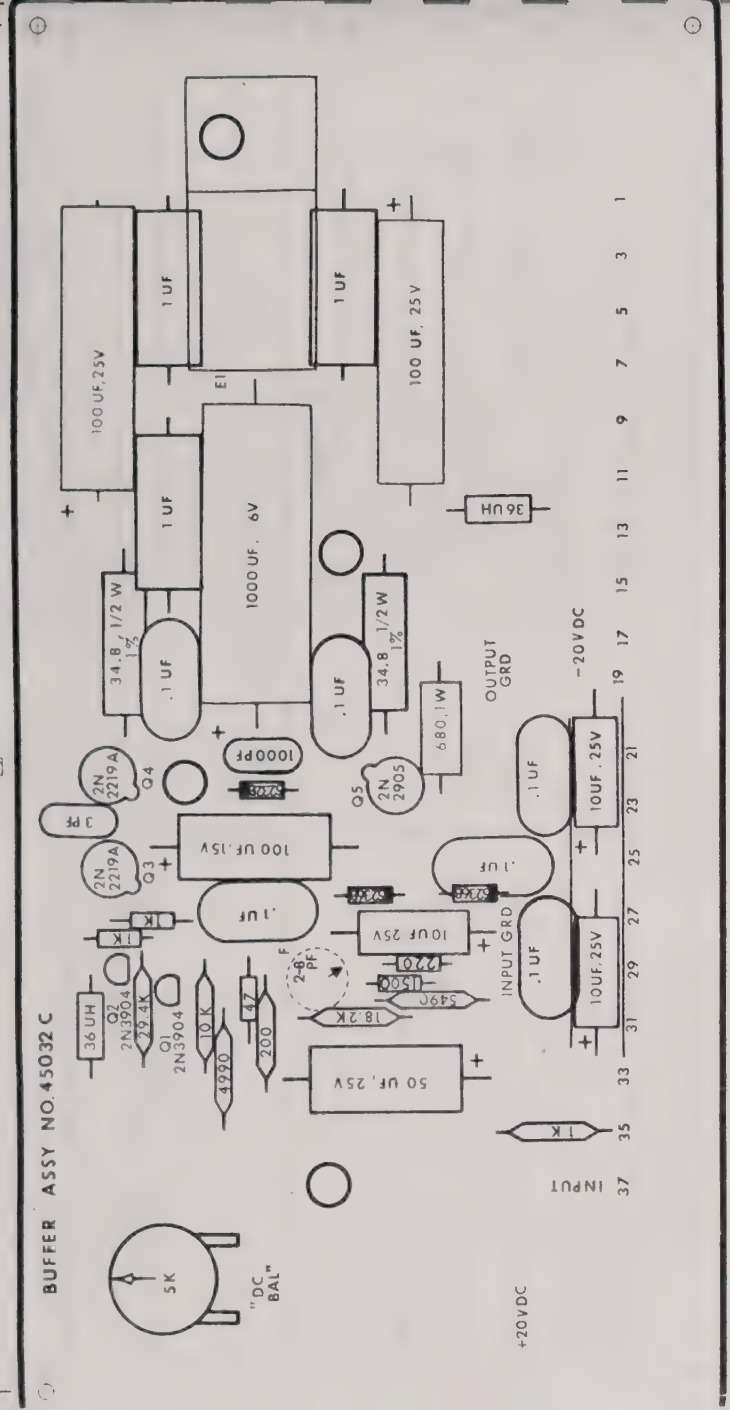
FINISH

SIZE C

CODE 45026

SCALE 2/1

SH 1 OF 1



REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	PRE RELEASE CHG.	10-24-68	
	C	PRE RELEASE REV.	11-1-68	RB

(4) INSTALL 2-8PF (ITEM 33) ON CIRCUIT SIDE, WITH ARROW.
(3) ADD TRANSISTOR PADS TO Q3, Q4, Q5 (2 EACH)
2. FOR SCHEMATIC DIAGRAM SEE DWG. NO. 45002.
(1) DIMENSION BETWEEN TARGET CENTERS.

	ITEM	REQD	PART NO	DESCRIPTION	VALUE	REFERENCE DESGNATION
	532	35	1	RESISTOR, 1/4W, 10%	1500	
	527	34	1	RESISTOR, 1/4W, 10%	220	
(4)	79	33	1	CAPACITOR	2-8 PF	
	389B	32	1	POTENTIOMETER	5K	
	11A	31	2	CHOKE	36 MH	
(3)	321	30	6	TRANSISTOR PAD		Q3, Q4, Q5 (2 EACH)
	846	25	2	TRANSISTOR	2N3904	Q1, Q2
	838B	21	1	TRANSISTOR	2N2905	Q5
	830B	26	2	TRANSISTOR	2N2219A	Q3, Q4
	244H	25		DIODE ZENER	IN5232B	
	244G	24		DIODE ZENER	IN5236B	
	47	23	1	CAPACITOR	100UF, 15V	
	135C	22	1	CAPACITOR	1000uF, 6V	
	145C	21	1		50uF, 25V	
	148	20	2		100UF, 25V	
		19	3	22005	1uF	
	42	18	1		10UF, 25V	
	40	17	1		0.1uF	
	46	16	1	CAPACITOR	1000PF	
	48	15	1	CAPACITOR	3 PF	
	603A	14		RESISTOR 1W, 10%	680	
	489	13	2	1/2W, 1%	34.8	
	468	12	1	1/4W, 1%	29.4K	
	463	11	1	1/4W, 1%	18.2K	
	446	10	1	1/4W, 1%	5490	
	456	9	1	1/4W, 1%	10K	
	445	8	1	1/4W, 1%	4990	
	403	7	1	1/4W, 1%	1K	
	399	6	1	1/4W, 1%	200	
	53	5	2	1/4W, 10%	1K	
	523	4	1	RESISTOR 1/4W, 10%	47	
		3	AR	WIRE (26 GAGE)		
		2	1	SEE TAB	HEATSINK ASSY	
		1	1	SEE TAB	DRILL & RIVET ASSY	

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
MECHANICAL DWG TOLERANCES
X ± .050 ANGULAR ± 0° 30'
XX ± .020
XXX ± .005 MACH SURF √
THREADS CLASS 2A OR 2B
REMOVE BURRS & SHARP EDGES .020 MAX
MACH FILLET RADIUS .020 R MAX
MACH SURF FLAT WITHIN .001 IN IN
OTHER SURF FLAT WITHIN .005 IN IN
ELECTRICAL DWG DESIGNATIONS
REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE DESIGNATION WITH THE NUMBER OF ASSEMBLY DESIG NATION

ABBREVIATIONS PER MIL-STD-12

BY
DRAWN R. Bowden
CHK
ENGR
APPD P. Madsen
MFR

DATE
9-16-68
12-9

TITLE
PRINTED CIRCUIT ASSY
BUFFER AMPLIFIER

PRESTON SCIENTIFIC INCORPORATED
Anaheim Calif

MATERIAL

FINISH

SCALE 2/1

R
SIZE

45032
CODE

SH / OF 2

ITEM	REQD	PART NO.	DESCRIPTION	VALUE	REFERENCE DESGINATION
42	AIR		SILICON GREASE		903
41	2		WASHER. EXT. LOCK	#4	861
40	8		SCREW. PHL PAN HD.	4-40 X 1/4	669
39	2		STAND OFF		736
38	1		BNC. CONNECTOR		158C
37	1	SEE TAB	SHIELD. COMPONENT SIDE		
36	1	SEE TAB	SHIELD. CIRCUIT SIDE		

Box No.

LIST OF MATERIALS

PRESTON SCIENTIFIC INCORPORATED Anaheim, Calif.

TITLE BUFFER ASSY

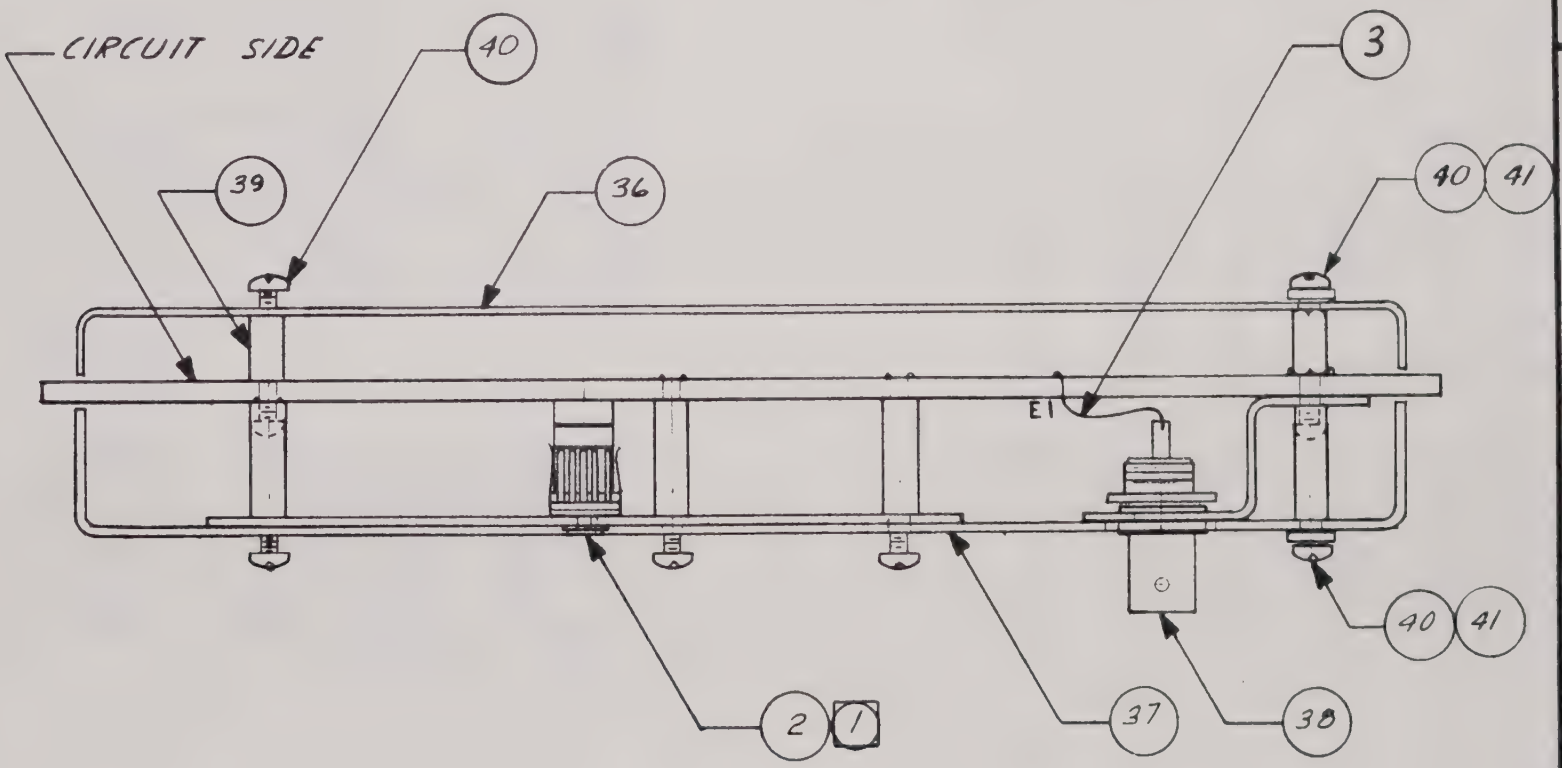
45032-T

CODE

SH 2 OF 3

NOTE:
1. ADD SILICON GREASE BETWEEN ITEMS NO. 2, 37 & Q3, Q4, Q5, HEATSINK.

TABULATION				
DWG	ITEM 1	ITEM 2	ITEM 36	ITEM 37
45032	45034	45022	45051	45052
45032-1	45034-1	45022-1	45051-1	45052-1



45032-T

CODE

SH 3 OF 3

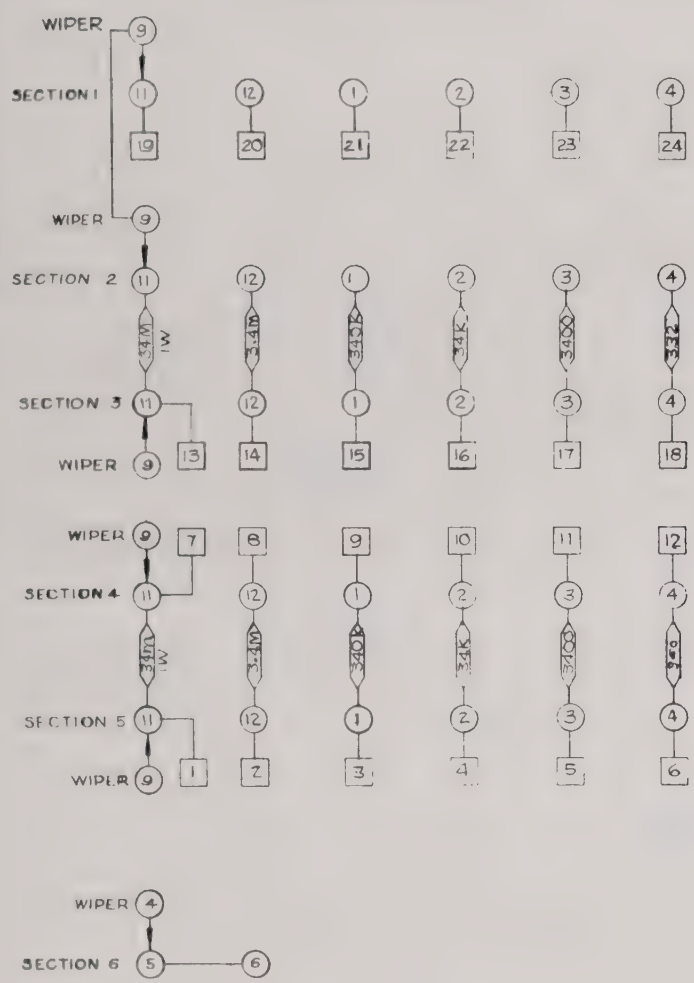
BUFFER SHIELD ASSY

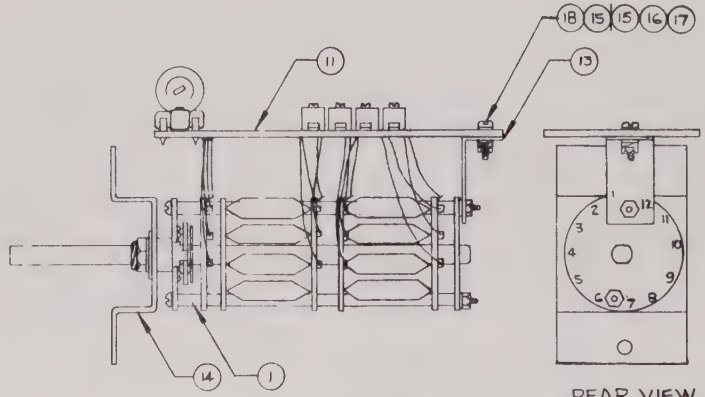
PRESTON SCIENTIFIC INCORPORATED
Anaheim, Calif.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	PRE RELEASE PLV	11 23 66	RB

TABULATION		
DWG	ITEM 13	ITEM 14
45037	45048	45030
45037-1	45048-1	45030-1

SWITCH WIRING





BOX NO	ITEM	REQD	PART NO.	DESCRIPTION	VALUE	REFERENCE DESIGNATION
666	18	1		SCREW 4-40X3/8 P.H.		
311	17	1		NUT #4-40		
874	16	1		WASHER, LOCK #4		
868	15	2		WASHER, FLAT #4		
	14	1	SEE TAB	BRACKET, MOUNTING SWITCH		
	13	1	SEE TAB	BRACKET, RANGE SWITCH		
998A	12	A/R		WIRE	20AWG	
	11	1	45026	TRIMMER CAPACITOR ASSY		
	10					
384G	9	2		RESISTOR, 1/4W, 1%	3.4M	
602C	8	2		1W, 1%	34M	
48K	7	2		1/4W 1%	340K	
	6					
469A	5	2		1%	34K	
437A	4	2		1%	3400	
401E	3	2		RESISTOR, 1/4W, 1%	332	
	2					
	1	1	45047	SWITCH		

LIST OF MATERIALS

4. ALIGN PARALLEL, TRIM CAP ASSY (ITEM 11) WITH TOP EDGE OF BRACKET (ITEM 14).
3. ALL WIRE TO BE 20 AWG.
2. ○ REPRESENTS CONTACTS ON SWITCH.
1. □ REPRESENTS PADS ON TRIMMER CAP ASSY. SOLDER 'C' SIDE & 'W' SIDE.

UNLESS OTHERWISE SPECIFIED
MECHANICAL DWG TOLERANCES
.X ± .020 ANGULAR ± 0° 30'
.XX ± .010 63
.XXX ± .005 MACH. SURF √
THREADS: CLASS 2A OR 2B
REMOVE BURRS & SHARP EDGES .020 MAX.
MACH. FILLET RADIUS .020 R MAX.
MACH. SURF. FLAT WITHIN .001 IN/IN
OTHER SURF. FLAT WITHIN .005 IN/IN
ELECTRICAL DWG DESIGNATIONS
REFERENCE DESIGNATIONS ARE ABBREVIATED PREFIX THE DESIGNATION WITH UNIT NUMBER OR ASSEMBLY DESIGNATION OR BOTH.

	BY	DATE
DRAWN	[illegible]	11-22-66
CHK	[illegible]	
ENGR		
APPD	[illegible]	11 23 66
APPD		

ABBREVIATIONS PER MIL STD-12

TITLE SWITCH ASSY-RANGE

MATERIAL

FINISH

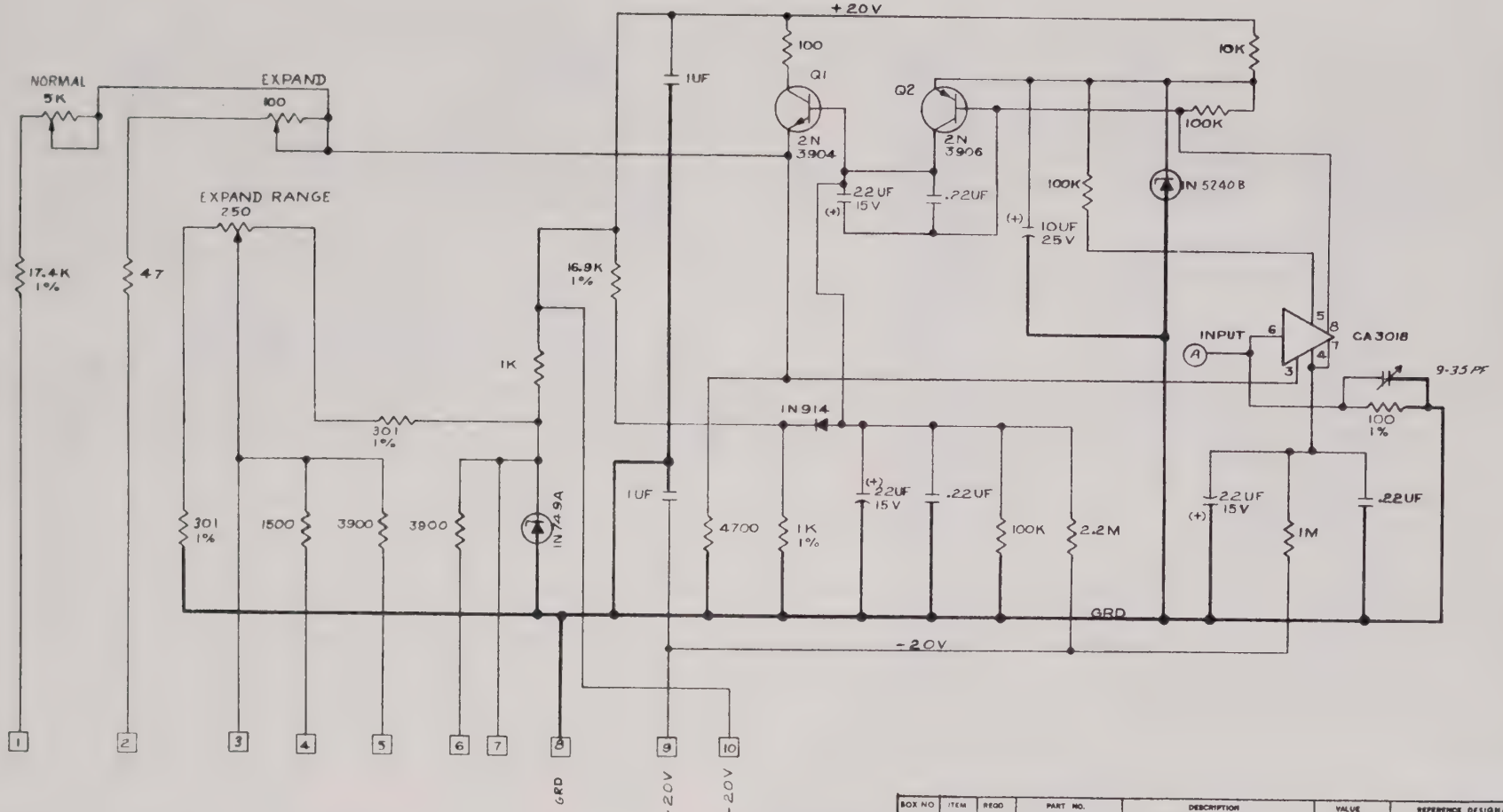
SCALE

PRESTON SCIENTIFIC INCORPORATED Anaheim, Calif

C 45037-T

SHEET 1 OF 1

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	PRE RELEASE REV	11-23-68	RB
B	EO 3041; ADD 9-35PF CAP.	12-17-68	RB



1. ALL RESISTORS ARE 1/4W, 10%.

BOX NO	ITEM	REQD	PART NO.	DESCRIPTION	VALUE	REFERENCE DESIGNATION

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
MECHANICAL DWG TOLERANCES
X ± .010 ANGULAR ± 0° 30'
XX ± .005 .02
XXX ± .010 MACH. SURF √
THREADS: CLASS 3A OR 2B
REMOVE BURRS & SHARP EDGES .005 MAX.
MACH FILLET RADIUS .005 R MAX
MACH SURF FLAT WITHIN .001 IN/IN
OTHER SURF FLAT WITHIN .005 IN/IN
ELECTRICAL DWG DESIGNATIONS
REFERENCE DESIGNATIONS

	BY	DATE
DRAWN	Barry Field	10-29-68
CHK		
ENGR		
APP'D	P Watson	11-9-68
APPD		

TITLE: SCHEMATIC, MONITOR BOARD

PRESTON SCIENTIFIC INCORPORATED
Anaheim, Calif

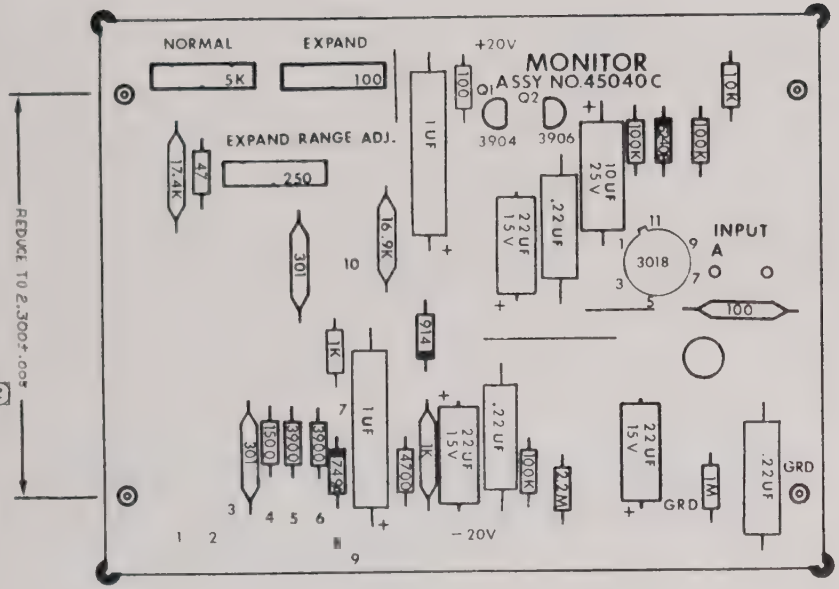
MATERIAL

FINISH

SIZE D

4504

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	PRE RELEASE REVISION	9/28/68	
B	PRE RELEASE REVISION	10-17-68	DLS
C	PRE RELEASE REVISION	11-23-68	



BOX NO	ITEM	REQD	PART NO	DESCRIPTION	VALUE	REFERENCE DESIGNATION
255D	35	1		EYELET		
994K	34	A/R		WIRE	22 AWG	
	33					
349C	32	1		POTENTIOMETER	5K	
341A	31	1		POTENTIOMETER	100	
343C	30			POTENTIOMETER	250	
846A	29	1		TRANSISTOR	2N3906	Q2
846	28	1		TRANSISTOR	2N3904	Q1
	27					
848G	26	1		INTEGRATED CIRCUIT	CA3018	
239	25	1		DIODE	IN914	
248J	24	1		DIODE	IN5240B	
232B	23	1		DIODE	IN749A	
3 77	22	1		CAPACITOR	9-35PF	
144	21	3		CAPACITOR	22UF, 15V	
142	20	1		↕	10UF, 25V	
	19	2		↕	1UF	
	18	3		CAPACITOR	.22 UF	
	17					
4E	16	1		RESISTOR 1/4W, 1%	17.4K	
401B	15	2		↕ 1/4W, 1%	301	
409	14	1		↕ 1/4W, 1%	1K	
461	13	1		1/4W, 1%	16.9K	
523	12	1		1/4W, 10%	47	
553	11	1		1/4W, 10%	2.2M	
[illegible]	10	1		↕	1M	
[illegible]	9	3		↕	100K	
[illegible]	8	1		↕	10K	
[illegible]	7	1		↕	4700	
[illegible]	6	2		↕	3900	
[illegible]	5	1		↕	1500	
[illegible]	4	1		↕	1K	
[illegible]	3	1		RESISTOR 1/4W, 10%	100	
	2					
	1	1	45043	DRILL & RIVET ASSY		

LIST OF MATERIALS

3 MOUNT (ITEM 22) ON CIRCUIT SIDE.

2 DIMENSION TO TARGET CENTERS

1. FOR SCHEMATIC DIAGRAM SEE DWG NO. 45041.

NOTE: UNLESS OTHERWISE SPECIFIED.

UNLESS OTHERWISE SPECIFIED
MECHANICAL DWG TOLERANCES
X ± .060 ANGULAR ± 0° 30'
XX ± .030
XXX ± .005 MACH SURF 63
THREADS CLASS 2A OR 2B
REMOVE BURRS & SHARP EDGES .020 MAX
MACH. FILLET RADIUS .020 R MAX
MACH. SURF. FLAT WITHIN .001 IN IN
OTHER SURF. FLAT WITHIN .005 IN IN
ELECTRICAL DWG. DESIGNATIONS
REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE DESIGNATION WITH UNIT NUMBER OR ASSEMBLY DESIGNATION OR BOTH

	BY	DATE
DRAWN	STEINER	9-30-68
CHK	[illegible]	9-30-68
ENGR		
APPD	[illegible]	12-9
APPD		

ABBREVIATIONS PER MIL STD 12

TITLE
PRINTED CIRCUIT ASSY
MONITOR

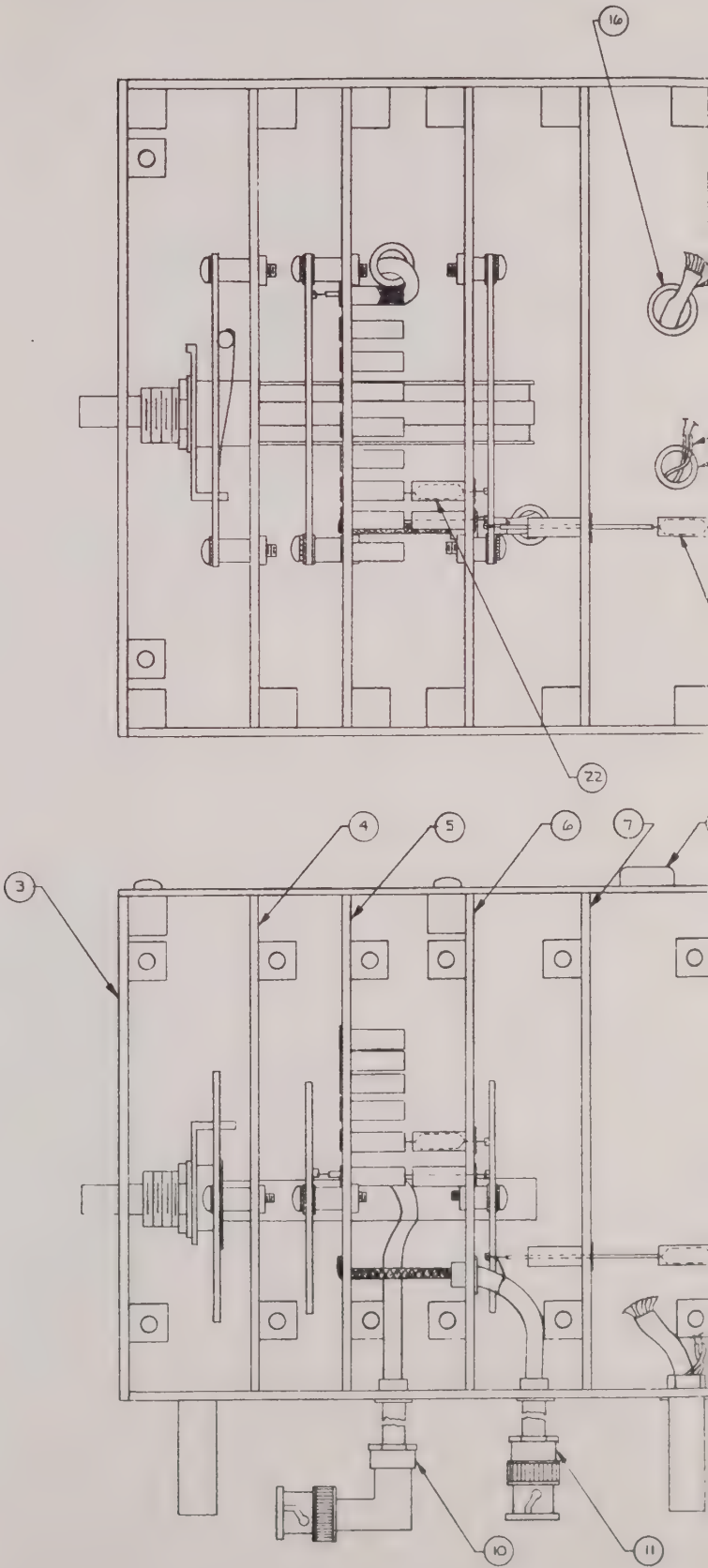
PRESTON SCIENTIFIC INCORPORATED

MATERIAL

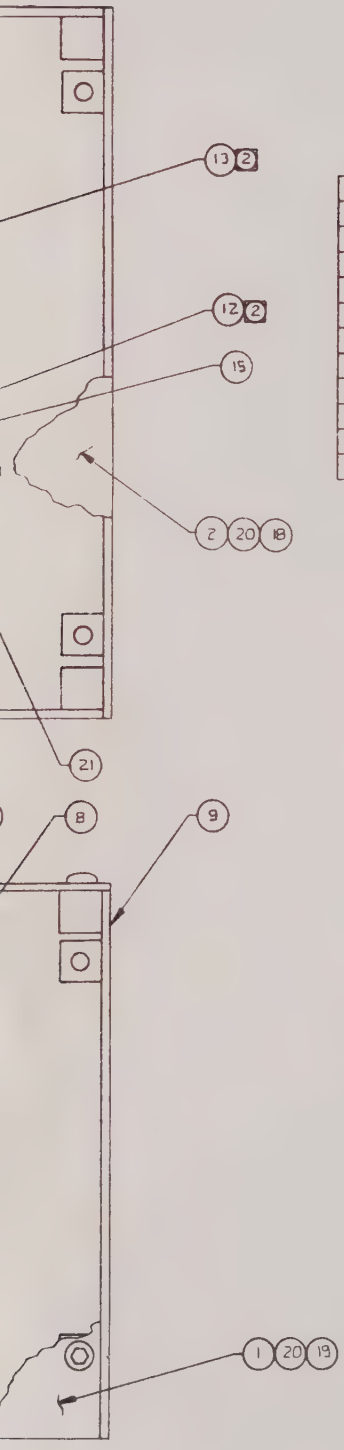
FINISH

C 45040

SCALE 2/1 SIZE CODE SH 1 OF 1


16
22
4
5
6
7
3
10
11

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL



WIRING TABLE		
COLOR	TO	
RED	1	7 COND SHLD (ITEM 13)
BLUE	2	
YEL	3	
ORG	4	
WHT	5	
PURPLE	6	
SLATE	7	
BLK	8	
BLK	9	TW PAIR (ITEM 12)
WHT	10	

BOX NO	ITEM	REQD	PART NO.	DESCRIPTION	VALUE	REFERENCE DESIGNATION
	24					
	23					
399N	22	1		RESISTOR, 1/4W 1%	60.4	
401L	21	1		RESISTOR, 1/4W 1%	365	
865A	20	34		WASHER, SPRING		
709D	19	28		SCREW, BH 4-40 X 1/4		
669	18	6		SCREW, PHMS 4-40 X 1/4		
282	17	2		PLUG		
ZX	16	1		BUSHING, SNAP		
ZW	15	3		BUSHING, SNAP		
	14					
	13	1	40216	CABLE, INTERCONNECT		
973J	12	AR		WIRE, 22AWG	BLK & WHT	
	11	1	40209	CABLE ASSY, INPUT		
	10	1	40197	CABLE ASSY, OUTPUT		
	9	1	40206	PLATE #6		
	8	1	45040	PC ASSY MONITOR		
	7	1	40214	PLATE #4 ASSY		
	6	1	40213	PLATE #3 ASSY		
	5	1	40212	PLATE #2 ASSY		
	4	1	40211	PLATE #1 ASSY		
	3	1	40200	PLATE #0		
	2	1	40195	COVER, TOP		
	1	1	40196	FRAME		

LIST OF MATERIALS

40191

[2] SEE WIRING TABLE.

1. FOR WIRING INFORMATION SEE DWG. 45002

NOTES:

UNLESS OTHERWISE SPECIFIED
MECHANICAL DIMS TOLERANCES
ELECTRICAL DIMS DESIGNATIONS

	BY	DATE
DRAWN		
CHK		
ENGR		
APPD		
APPD		

ABBREVIATIONS PER MIL-STD-12

TITLE: ATTENUATOR ASSY

PRESTON SCIENTIFIC INCORPORATED Anaheim Calif

MATERIAL

FINISH

SCALE 2/1

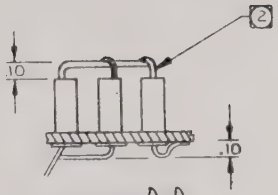
SIZE D

CODE

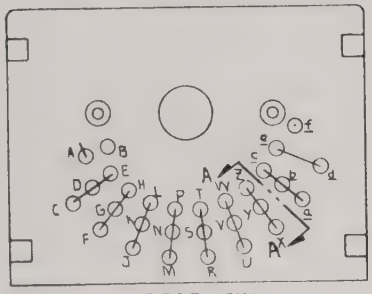
DWG 40191

SH 1 OF 1

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL

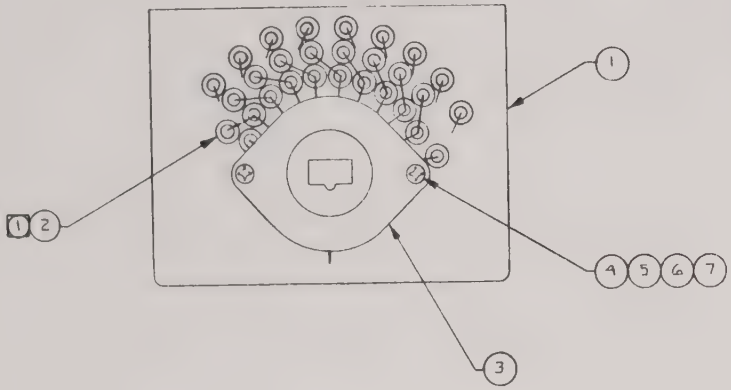


SECTION A-A
SCALE 2/1



REAR VIEW

RESISTOR LOCATION TABLE		
LOCATION	RESISTOR	ITEM NO.
A	100	12
B		
C	71.5	11
D	52.3	9
E	52.3	9
F	71.5	11
G	52.3	9
H	52.3	9
J	71.5	11
K	52.3	9
L	52.3	9
M	71.5	11
N	52.3	9
P	52.3	9
R	71.5	11
S	52.3	9
T	52.3	9
U	71.5	11
V	52.3	9
W	52.3	9
X	71.5	11
Y	52.3	9
Z	52.3	9
a	71.5	11
b	52.3	9
c	52.3	9
d	105	13
e	61.9	10
f	49.9	8



4. INSURE THAT ALL UNUSED HOLE ARE FREE OF SOLDER.
3. FOR WIRING INFORMATION SEE DWG. NO. 40215

2 BEND LEADS 180° AND SOLDER.

1 INSTALL & SOLDER ITEM 2 TO ITEM 1 NEASIDE.

NOTES:

BOX NO	ITEM	REQD	PART NO.	DESCRIPTION	VALUE	REFERENCE DESIGNATION
397N	13	1		RESISTOR, 1/4W 1%	105	
397M	12	1			100	
394R	11	8			71.5	
394P	10	1			61.9	
394M	9	16			52.3	
394L	8	1		RESISTOR, 1/4W 1%	49.9	
859	7	4		WASHER, FLAT #4		
730	6	2		SPACER 1/4 LG.		
861	5	2		WASHER, ET. #4		
669	4	2		SCREW, PHMS 4-40 X 5/8		
	3	1	40194-1	SECTION		
255D	2	29		EYELET		
	1	1	40202	PLATE 2		

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
MECHANICAL DWG TOLERANCES
X ± .030 ANGULAR ± 0° 30'
XX ± .010 63
XXX ± .005 MACH SURF √
THREADS CLASS 3A OR 2B
REMOVE BURRS & SHARP EDGES .020 MAX.
MACH FILLET RADIUS .010 R MAX.
MACH SURF. FLAT WITHIN .001 IN/IN
OTHER SURF. FLAT WITHIN .005 IN/IN
ELECTRICAL DWG. DESIGNATIONS
REFERENCE DESIGNATIONS ARE ABBREVIATED PREFIX TWO DESIGNATION WITH UNIT

ABBREVIATIONS PER MIL-STD-12

	BY	DATE
DRAWN	[illegible]	10-28-68
CHK		
ENGR		
APPD	[illegible]	11-4-68
APPD		

TITLE: PLATE 2 ASSY

PRESTON SCIENTIFIC INCORPORATED
Anaheim, Calif

MATERIAL

FINISH

C

40212

SCALE 1/1 SHT 1 OF 1

SECTION 9
MANUAL CHANGE INFORMATION

Preston Scientific Incorporated is continually keeping up with the latest electronic developments by adding circuit and component improvements to our instruments as soon as development and testing permit.

These changes, due to printing and shipping requirements, may not be immediately incorporated into the manual. Therefore, your manual may contain new change information on the following pages. If it does not, your manual is correct as printed.

WARRANTY

Electronic instruments sold by Preston Scientific Incorporated are warranted only as stated below:

Subject to the exceptions and upon the conditions specified below, Preston Scientific agrees to correct, either by repair or, at its election, by replacement, any defect of material or workmanship which develops within one year after delivery of the instrument to the original purchaser by Preston Scientific or by an authorized representative, provided Preston Scientific's investigation or factory inspection discloses that such defect developed under normal and proper use and as directed in the Preston Scientific instruction manual. The exceptions and conditions mentioned above are the following:

1. During the year following the date of delivery, Preston Scientific will service, free of charge, any chassis at its plant which is returned to Preston Scientific's plant, transportation charges prepaid. It will be returned to the customer with the transportation charges collect.

2. Preston Scientific shall be released from all obligations under its warranty in the event repair or modifications are made by persons other than its own authorized service personnel unless such repairs by others are made with the written consent of Preston Scientific, or unless such repair is merely the installation of a new Preston Scientific plug-in component.

3. Preston Scientific makes no warranty express or implied (either in fact or by operation of law), statutory or otherwise, and except to the extent stated above, Preston Scientific shall have no liability under any warranty, express or implied (either in fact or by operation of law), statutory or otherwise.

4. Preston Scientific expressly disclaims any liability to the purchaser or any other person for consequential damages of any kind and from any cause whatsoever, arising out of or in any way connected with the manufacture, sale, handling, maintenance, repair, or replacement of said equipment by the buyer or by others.

5. Representations or warranties made by any person, including representatives of Preston Scientific, which are inconsistent with or in conflict with the terms of this agreement (including, but not limited to, the limitations on the liability of Preston Scientific as set forth in the above paragraph), shall not be binding upon Preston Scientific unless expressly agreed to in writing and approved by an officer of Preston Scientific.

This warranty shall be governed by the laws of the State of California.

Preston Scientific
Leaders in the development and manufacture of
precision amplifiers and analog-to-digital
conversion systems since 1959.

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PRESTON

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